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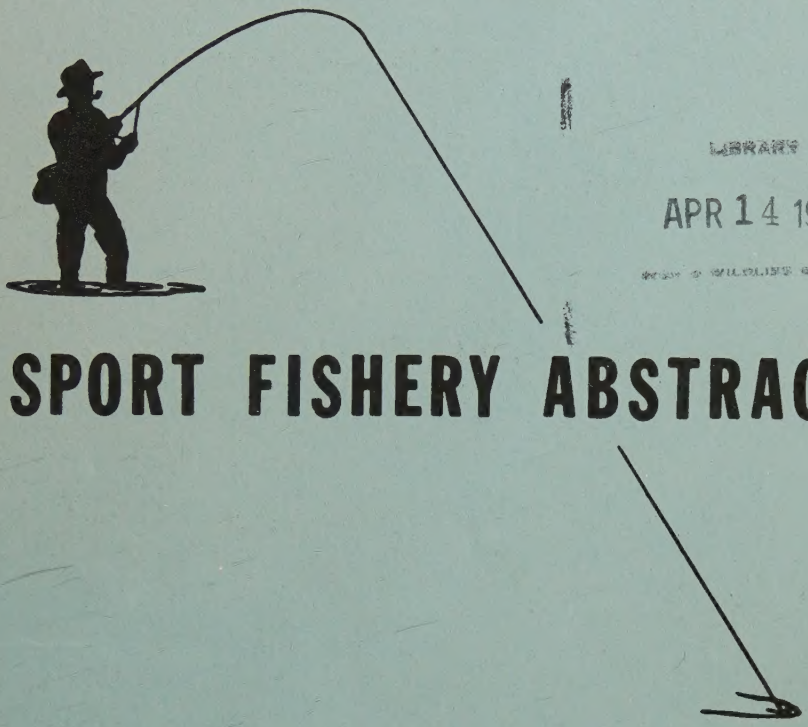

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# SPORT FISHERY ABSTRACTS

Vol. 25, No. 1, 1980

DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR
CECIL D. ANDRUS, SECRETARY

*Robert L. Herbst, Assistant Secretary for Fish and Wildlife and Parks*
*Fish and Wildlife Service, Lynn A. Greenwalt, Director*

# SPORT FISHERY ABSTRACTS

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*Sport Fishery Abstracts* is intended to furnish fishery biologists with abstracts of current literature in sport fishery research and management.

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# SPORT FISHERY ABSTRACTS

An abstracting service for fishery research and management

Volume 25 Number 1 1980

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## AQUATIC PLANTS AND THEIR CONTROL

80-000001 Hitchin, G. G. WEED HARVESTING AS A VIABLE LAKE MANAGEMENT TECHNIQUE. Trent Univ. Biol. Dep. Ecol. Bull. 2 (1): 16-20. 1976. SFA 25(1)
[Limnol. Toxicity Sect., Minist. Environ., Rexdale, ON, Canada]

80-000002 Ogle, J. TRANSLUCENT TANK FOR ALGAL CULTURE. Prog. Fish-Cult. 47 (4): 191. Oct. 1979. SFA 25(1)
[Gulf Coast Res. Lab., East Beach Dr., Ocean Springs, MS 39564]

80-000003 Skea, J. C.; Simonin, H. A. EVALUATION OF CUTRINE FOR USE IN FISH CULTURE. Prog. Fish-Cult. 47 (4): 171-174. Oct. 1979. SFA 25(1)
[N.Y. State Dep. Environ. Conserv., 8314 Fish Hatchery Rd, Rome 13440]

## GENERAL FISH CULTURE

80-000004 Lovell, R. T. FISH CULTURE IN THE UNITED STATES. Science 206 (4425): 1368-1372. 21 Dec. 1979. SFA 25(1)
[Dep. Fish. Allied Aquacult., Auburn, AL 36830] The culture of channel catfish, trout, and crayfish is a well-established, profitable enterprise, but aquaculture provides only a fraction of the protein consumed by Americans, who prefer red meat. This situation could change, since pond-raised fish require less energy for protein synthesis than land animals, the supply of ocean food fish no longer appears inexhaustible, and fish culture can utilize resources unsuitable for other agriculture.

80-000005 Tal, S. THE CONCEPT OF AQUACULTURE. Bamidgeh 31 (2): 23-25. June 1979. SFA 25(1)
[Minist. Agric., Fish. Dep., Hakiriah, Tel-Aviv, Israel]

## TROUT AND SALMON CULTURE

80-000006 Blanc, J. M.; Chevassus, B. INTERSPECIFIC HYBRIDIZATION OF SALMONID FISH. I. HATCHING AND SURVIVAL UP TO THE 15TH DAY AFTER HATCHING IN F1 GENERATION HYBRIDS. Aquaculture 18 (1): 21-34. Sept. 1979. SFA 25(1)
[Lab. Ecol. Poissons Amenage. Peches, I.N.R.A., St.-Pee-sur-Nivelle, 64 310 Ascain, France] Artificial hybridizations were carried out with 17 combinations using six species of Salmonidae, namely chinook

80-000006 CONTINUED
and coho salmon, rainbow and brown trout, Atlantic salmon and brook trout. Success at the eyed stage, survival rates up to the 15th day after hatching, length of the incubation period and dispersion of hatching times were examined with reference to monospecific control lots. Success and survival rates of hybrids were found to be inferior or at the best similar to those of parental species. Significant maternal effects were observed within most types of crosses. Highly variable interaction factors were found to influence the length of incubation of hybrids, which could exceed that of either parental species. The dispersion of hatching times was greater in hybrids than in pure species and tended to be negatively correlated to survival. A few types of hybrids showed promising results at the end of the experiment and their potential interest for aquaculture is discussed.

80-000007 Harris, L. E. MANIPULATING PHOTOPERIODS IN HATCHERY-REARED RAINBOW BROODFISH TO CONTROL SPAWNING ACTIVITIES. Colo. Div. Wildl. Fish. Inf. Leafl. No. 32. 2p. Oct. 1979. SFA 25(1)
[Colo. Div. Wildl., 317 W. Prospect, Fort Collins 80522]

80-000008 Higgs, D. A.; Fagerlund, U. H. M.; McBride, J. R.; Eales, J. G. INFLUENCE OF ORALLY ADMINISTERED /L/-THYROXINE OR 3,5,3'-TRIIODO-/L/-THYRONINE ON GROWTH, FOOD CONSUMPTION, AND FOOD CONVERSION OF UNDERYEARLING COHO SALMON (/ONCORHYNCHUS KISUTCH/). Can. J. Zool. 57 (10): 1974-1979. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada] Between August and November, groups of underyearling coho salmon, held at 10°C and on a natural photoperiod, were fed twice daily to satiation with Oregon moist pellets supplemented with 0, 20, 100, or 500 ppm of L-thyroxine (T(4)) or 3,5,3'-triiodo-L-thyronine (T(3)). The T(3) significantly increased weight (20 and 100 ppm) and length (all doses), depressed condition factor (100 and 500 ppm), stimulated food consumption (20 ppm), improved food conversion (all doses), decreased thyroid follicle epithelial height (500 ppm), and influenced pituitary basophil and somatotrop number, size, and granulation. The T(4) influenced neither growth nor food conversion, but did increase food consumption (20 ppm) and condition factor (500 ppm), and decreased thyroid follicle epithelial height (500 ppm). No breakdown of either added T(4) or T(3) was observed during prolonged food storage. It is concluded that T(3), unlike T(4), can be administered in the diet of coho held at 10°C to enhance growth and improve food conversion.

80-000009 Johnstone, R.; Simpson, T. H.; Youngson, A. F.; Whitehead, C. SEX REVERSAL IN SALMONID CULTURE. PART II. THE PROGENY OF SEX-REVERSED RAINBOW TROUT. Aquaculture 18 (1): 13-19. Sept. 1979. SFA 25(1)
[Mar. Lab., Aberdeen, Scotland] A sample of the all-male population of rainbow trout resulting from the dietary administration of 17 alpha-methyltestosterone at a concentration of 3 mg/kg of food to juvenile fish during the 90-day period following "swim up" was grown to sexual maturity. It was observed that in many specimens there were deformations of the reproductive system which prevented the normal expression of milt although spermatozoa from the testes were viable. Sperm specimens removed surgically or normally expressed from mature fish were separately used to fertilise the mixed ova from untreated females. All the progeny of one such pairing were females. This indicates that in rainbow trout it is the female sex which is homogametic. Samples of the all-female population which resulted from the dietary administration of 17 beta-oestradiol at a concentration of 20 mg/kg of food to rainbow trout fry during the 56-day period

80-000009 CONTINUED
following "swim up" were also grown to maturity. The ova stripped from these fish were separately fertilised with mixed milt expressed from normal males. The progeny of two of five such pairings had a combined male to female ratio of 2.2, indicating that in rainbow trout the male is heterogametic for sex. The results were insufficient to permit any reliable estimate of the degree of impairment of the viability of the YY constitution. A method of producing single sex populations by the mating of sex reversed with normal fish is discussed.

80-000010 Johnstone, R.; Simpson, T. H.; Walker, A. F. SEX REVERSAL IN SALMONID CULTURE. PART III. THE PRODUCTION AND PERFORMANCE OF ALL-FEMALE POPULATIONS OF BROOK TROUT. Aquaculture 18 (3): 241-252. Nov. 1979. SFA 25(1)
[DAFS Mar. Lab., P.O. Box 101, Victoria Rd., Aberdeen, Scotland]
Oral administration of 17 beta-oestradiol at 20 mg/kg diet for a period from 0 to 60 days following "swim-up" resulted in the sex reversal of male brook trout and the production of essentially all-female populations. The gonads of these animals were indistinguishable from the ovaries of untreated fish. Oral administration of this hormone at the same concentration but for the period from 0 to 40 days resulted in a population which comprised 67 percent females, 21 percent males and 12 percent bisexual animals. Within the control group, the growth rate of males was significantly greater than that of females. Growth in the all-female stocks produced by dietary oestradiol administration (0-60 days) was significantly lower than that of the untreated population taken as a whole but was identical to that of the control females. The growth of brook trout during the first year was closely comparable to that of rainbow trout reared under identical conditons. During the second year, the growth of the rainbow trout exceeded that of the brook trout. At 19 months of age, all the animals in the control and oestradiol treated brook trout populations were fully mature; maturity in the rainbow trout was substantially confined to males.

80-000011 Pitman, R. W. EFFECTS OF FEMALE AGE AND EGG SIZE ON GROWTH AND MORTALITY IN RAINBOW TROUT. Prog. Fish-Cult. 47 (4): 202-204. Oct. 1979. SFA 25(1)
[Pittsford Natl. Fish Hatchery, Pittsford, VT 05736]

80-000012 Smoker, W. W.; Kerns, C. L. ARTIFICIAL SALMON SPAWNING. A MANUAL. Univ. Alaska Sea Grant Mar. Advis. Bull. No. 7. 21p. 1979. SFA 25(1)
[Div. Fish., Univ. Alaska, P.O. Box 1447, Juneau 99802]

OTHER ANADROMOUS SPECIES CULTURE

80-000013 Wawronowicz, L. J.; Lewis, W. M. EVALUATION OF THE STRIPED BASS AS A POND-REARED FOOD FISH. Prog. Fish-Cult. 41 (3): 138-140. July 1979. SFA 25(1)
[Fish. Res. Lab., South. Ill. Univ., Carbondale 62901]

WARMWATER CULTURE

80-000014 Babiker, M. M.; Ibrahim, H. STUDIES ON THE BIOLOGY OF REPRODUCTION IN THE CICHLID /TILAPIA NILOTICA/ (L.): EFFECTS OF STEROID AND TROPHIC HORMONES ON OVULATION AND OVARIAN HYDRATION. J. Fish Biol. 15 (1): 21-30. July 1979. SFA 25(1)
[Dep. Zool., Univ. Khartoum, Sudan] The effects of intraperitoneal injections of cortical and ovarian steroids and trophic (mammalian) hormones on ovulation, ovarian hydration and the distribution of sodium ions in muscles and ovary was studied in /Tilapia nilotica/. Corisol, corticosterone and oestradiol 17 Beta (50-250 mg $kg^{-1}$ B.W.) induced ovulation in a dose-dependent manner and increased the degree of hydration of muscle and ovarian tissues. The sodium ion content of muscles was reduced and that of ovaries increased following treatment with these hormones. Oestrone, Oestriol and progesterone (60-245 mg $kg^{-1}$ B.W.) failed to induce ovulation but produced the same types of effects on the water and sodium ion content of muscles and ovaries as the other steroids. Human chorionic Gonadotrophin, HCG, (1200-12,000 I.U. $kg^{-1}$ B.W.) also induced ovulation and increased the degree of hydration of muscles and ovaries and increased the sodium ion concentration in ovarian and reduced that of muscle tissues. Pregnant Mare Gonadotrophin, PMG, in doses similar to those of HCG, did not induce ovulation in any of the treated fish and did not significantly alter the water or sodium ion content of muscles and ovaries.

80-000015 Baur, R. J.; Buck, D. H.; Rose, C. R. PRODUCTION OF AGE-0 LARGEMOUTH BASS, SMALLMOUTH BASS, AND BLUEGILLS IN PONDS STOCKED WITH GRASS CARP. Trans. Am. Fish. Soc. 108 (5): 496-498. Sept. 1979. SFA 25(1)
Ill. Nat. Hist. Surv. ,Kinmundy 62854]

80-000016 Bulak, J. S.; Walker, P. T. SPAWNING AND CULTURE POTENTIAL OF BLUEBACK HERRING IN PONDS. Prog. Fish-Cult. 47 (4): 183-184. Oct. 1979. SFA 25(1)
[S.C. Dep. Wildl. Mar. Resour., P.O. Drawer 170, Bonneau 29431]

80-000017 Ghorai, A. K.; Mondal, K. M.; Sengupta, A.; Chakraborty, D.; Ranadhir, M.; Das, P.; Jhingran, V. G. ATTAINMENTS OF COMPOSITE FISH CULTURE DEMONSTRATION CENTRES IN WEST BENGAL DURING 1976-77. Cent. Inland Fish. Res. Inst. Barrackpore Bull. No. 30. 18p. Feb. 1979. SFA 25(1)
[Cent. Inland Fish. Res. Inst., Barrackpore, West Bengal, India]

80-000018 Hogendoorn, H. CONTROLLED PROPAGATION OF THE AFRICAN CATFISH, /CLARIAS LAZERA/ (C. & V.). I. REPRODUCTIVE BIOLOGY AND FIELD EXPERIMENTS. Aquaculture 17 (4): 323-333. Aug. 1979. SFA 25(1)
[Dep. Fish Cult. Inland Fish., Agric. Univ., P.O. Box 338, Wageningen, The Netherlands] Field experiments on controlled propagation of /Clarias lazera/ (C. & V.) were carried out in Cameroon in 1975-1976. Reproduction was induced in small ponds using desoxycorticosterone acetate. In artificial reproduction experiments, ovulation was induced with acetone-dried carp pituitary and the sexual products were obtained by stripping the females and dissecting the males. Artificial fertilization, incubation and hatching of the eggs were successfully carried out. Different methods of producing fingerlings in ponds were compared but none was considered satisfactory. Rearing the fry in troughs was not achieved, but it is

80-000018 CONTINUED
felt that this offers the best prospects for reliable production of fingerlings. Suggestions for further improvement of the techniques are given.

80-000019 Horvath, L. ELIMINATION OF THE GLUTINOSITY OF WELS (/SILURUS GLANIS/ L.) EGGS BY INDUSTRIAL ENZYME. Riv. It. Piscic. Ittiop. 14 (2): 39-44. Apr.-May-June 1979. In English and Italian. SFA 25(1)

80-000020 Jhingran, V. G.; Sehgal, K. L.; Kumar, K.; Ghosh, B. B. REARING ADVANCED FRY OF MAJOR INDIAN CARP SPECIES IN RECIRCULATORY-FILTERING PONDS AT BARRACKPORE, WEST BENGAL. Aquaculture 18 (1): 45-49. Sept. 1979. SFA 25(1)
[Cent. Inland Fish. Res. Inst., Barrackpore 743 101, West Bengal, India] This paper describes an experiment using a recirculatory-filtering system operating in two rectangular cemented ponds (160 and 190 m², 1.5 m deep) to rear fry (25 mm-50 mm) of the major Indian carp species /Labeo rohita/ (Hamilton) and /Catla catla/ (Hamilton) to fingerlings (100 mm-125 mm). These oeprations were concluded in both the species in 32 days at stocking densities of 0.46 million/ha and 0.55 million/ha, and showed survival rates of 96.6 percent and 84.4 percent respectively. In the presently followed practices of modern fish culturists, corresponding operations in earth ponds usually take 90 days and have a stocking density of 0.2 million/ha with survival rates more or less similar to those obtained in the recirculatory-filtering system. If followed by industry, the technique described will enable production of major Indian carp fingerlings with great saving in time, the use of water and the space occupied by the production system. These advantages greatly enhance the economic viability of rearing carp fingerling in India.

80-000021 Kuo, C.-M.; Nash, C. E.; Watanabe, W. O. INDUCED BREEDING EXPERIMENTS WITH MILKFISH, /CHANOS CHANOS/ FORSKAL, IN HAWAII. Aquaculture 18 (2): 95-105. Oct. 1979. SFA 25(1)
[Oceanic Inst., Waimanalo, HI 96795] The hormones SG-G100, CPH, and HCG were used to induce spawning of the milkfish. A total of 22 potentially receptive females were injected. Females with oocytes 0.7 mm in diameter or above offer the greatest chance for success. A priming dose of hormone injected immediately after capture reduces the effects of stress oratresia. Under optimal conditions, the spawning of milkfish can be induced by two or three injections of total dose up to 200 mg CPH with 25,000 IU HCG. Mature females respond more readily to injections without the added stress of salinity adjustment.

80-000022 Lesser, W.; Vilstrup, R. THE SUPPLY AND DEMAND FOR YELLOW PERCH 1915-1990. Univ. Wis. Coll. Agric. Life Sci. Res. Bull. R3006. 14p. Apr. 1979. SFA 25(1)
[Agric. Econ., Cornell Univ., Ithaca, NY]

80-000023 Liao, I-C.; Juario, J. V.; Kumagai, S.; Nakajima, H.; Natividad, M.; Buri, P. ON THE INDUCED SPAWNING AND LARVAL REARING OF MILKFISH, /CHANOS CHANOS/ (FORSKAL). Aquaculture 18 (2): 75-93. Oct. 1979. SFA 25(1)
[Tungkang Mar. Lab., Tungkang, Pingtung 916, Taiwan] A female milkfish, captured at sea, was injected with two hormonal injections of acetone-dried salmon pituitary powder and human chorionic gonadotropin, plus Vitamin B complex. It was stripped, and produced 128,000 ripe eggs with an average diameter of 1.15 mm. Fertilization

80-000023 CONTINUED
rate was 38 percent following artificial fertilization with milt from an uninjected male. A total of 36,000 larvae hatched (74 percent of fertile eggs) after 26-32 h at 34 °/oo salinity and 27-32°C. The newly hatched larvae measured 3.4 mm in mean total length and possessed a large yolk sac. The mouth of the larvae opened about 54 h after hatching. The larvae were fed with fertilized oyster eggs, rotifers, copepods, brine shrimp, flour and prepared feed, together with /Chlorella/. A critical period was between the 4th and 6th days with mortality over 80 percent. The larvae started increasing in length by Day 8, and had the appearance of the wild fry by Day 11. On Day 13 a pigmentation pattern developed and the biggest larva measured 10.0 mm. By Day 18 the larvae measured 12.5 mm, and 14.5 mm by Day 21. A total of 2,859 fry was obtained; the highest larval survival rate obtained from different experimental groups was 46.8 percent.

80-000024 Rappaport, U.; Sarig, S. THE EFFECT OF POPULATION DENSITY OF CARP IN MONOCULTURE UNDER CONDITIONS OF INTENSIVE GROWTH. Bamidgeh 31 (2): 26-34. June 1979. SFA 25(1)
[Intensive Fish Cult. Stn., Fish. Dep., Ginosar, Israel] The effect of stocking carp at densities of 20,000, 16,000, 13,000, 7,000 and 4,000 fish/ha under intensive growth conditions was tested on growth rate and rentability. It was proved that reduction of stocking density from 20,000 to 4,000 carp/ha resulted in: a) in increased individual daily growth rate of up to 55 percent; b) a drop of 17-33 percent in FCR. A density of 4,000 fish/ha in comparison with the higher density of 20,000 resulted in: a) a 68 percent drop in daily growth increment perunit area; b) a yield of 3,210 kg for 153 days of growth at a density of 4,000 fish/ha, as against 10,100 kg at a density of 20,000. The net income per ha (without subtracting interest and depreciation expenses) increased by 56 percent in the most extreme case (stocking rate of 1,600) in comparison with that at a stocking density of 4,000 fish/ha.--Summ.

80-000025 Romaire, R. P.; Boyd, C. E. EFFECTS OF SOLAR RADIATION ON THE DYNAMICS OF DISSOLVED OXYGEN IN CHANNEL CATFISH PONDS. Trans. Am. Fish. Soc. 108 (5): 473-478. Sept. 1979. SFA 25(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830]

80-000026 Schachte, J. H., Jr. IODOPHOR DISINFECTION OF MUSKELLUNGE EGGS UNDER INTENSIVE CULTURE IN HATCHERIES. Prog. Fish-Cult. 47 (4): 189-190. Oct. 1979. SFA 25(1)
[N.Y. State Dep. Environ. Conserv., Fish Dis. Control Unit, 8314 Fish Hatchery Rd., Rome 13440]

80-000027 Srivastava, J. B.; Chowdhary, S. K. CULTURE OF /CATLA CATLA/ IN A LENTIC IMPOUNDMENT IN JAMMU. Aquaculture 18 (3): 283-285. Nov. 1979. SFA 25(1)
[Div. Rural Technol., Reg. Res. Lab. (C.S.I.R.), Canal Rd., Jammu Tawi, India] In May 1977, fry of /Catla catla/ was introduced for the first time by the Regional Research Laboratory, Jammu, for culturing in the inland waters of the region. One hundred tagged speciments and 250 untagged ones were stocked along with Indian major and Chinese carps in a rain- and partially sewage-fed impoundment having an area of 2.5 ha and depth ranging from 1.50 m to 3.25 m. Tagged specimens were caught by a cast net in July 1978. The average mean weight recorded was 4,750 g and the average mean length was 58.6 cm after 14 months. The largest specimen was 7,500 g in weight and 63.00 cm in length and the smallest 4,000 g in weight and 55.00 cm in length. The pond bloomed naturally with both phyto- and zooplankton throughout the

80-000027 CONTINUED
year, and no supplementary feed or fertilizer was provided.

80-000028 Tucker, L.; Boyd, C. E.; McCoy, E. W. EFFECTS OF FEEDING RATE ON WATER QUALITY, PRODUCTION OF CHANNEL CATFISH, AND ECONOMIC RETURNS. Trans. Am. Fish. Soc. 108 (4): 389-396. July 1979. SFA 25(1)
[Auburn Univ. Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830]

MARICULTURE

80-000029 Fortes, R. D. EVALUATION OF TENPOUNDER AND TARPON AS PREDATORS ON JAVA TILAPIA IN BRACKISHWATER PONDS IN THE PHILIPPINES. Ph.D. dissertation, Auburn Univ. 98p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(3):998. Sept. 1979. SFA 25(1)
Experiments were conducted in 500-$m^2$ ponds of the Univeristy of the Philippines to evaluate tenpounder (/Elops hawaiiensis/ Regan) and tarpon (/Megalops cyprinoides/ Broussone) as predators on Java tilapia (/Tilapia mossambica/ Peters). Tenpounder or tarpon-tilapia ratios of 0:1; 1:0; 1:5; 1:10 and 1:20 were tested in 4-month trials. Both tenpounder and tarpon reduced young tilapia populations and total production. The tenpounder tended to prey on original stocks of tilapia reducing the production of marketable fish. When stocked at sizes of 6 to 30 g, tenpounder appeared not to prey on tilapia fry. Tarpon, however, when stocked at sizes of 2 to 24 g, preyed on young tilapia and apparently did not prey upon the original stocks; thus more marketable tilapia were produced. The ratios 1:10 and 1:20 (tenpounder: tilapia) were promising, while the ratio 1:10 (tarpon: tilapia) was established to be the most desirable for tarpon. An interval of approximately 18 days between stocking of tilapia and predators was needed to prevent predation on original stocks. Milkfish-mixed sexes tilapia polyculture produced 283 kg/ha of milkfish, whereas, only 231 kg/ha of milkfish was produced in the milkfish-male tilapia combination. Total production in the former was higher (343 kg/ha) than in the latter (322 kg/ha). All-male tilapia culture produced 113 kg/ha marketable tilapia, whereas, only 40 and 51 kg/ha of marketable tilapia were produced from a mixed-sex tilapia monoculture and from a tarpon-mixed sexes tilapia combination, respectively. Polyculture of milkfish and mixed-sex tilapia with predator appeared to be more desirable than milkfish-male tilapia polyculture for milkfish production.--From abstr.

80-000030 McGlew, P. A.; Brown, D. E. LEGAL AND INSTITUTIONAL FACTORS AFFECTING MARICULTURE IN TEXAS. Coast. Zone Manage. J. 6 (1): 69-88. 1979. SFA 25(1)
[McGlew and Brown, Attorneys at Law, Austin, TX] Aquaculture and its specialized cousin, mariculture, provide some potential additional food sources and economic revenues. Technological barriers to increased mariculture production are being removed, but many legal and institutional barriers remain. Examples of the current and potential regulation of mariculture in Texas by state and federal authorities are examined. The effect of various state and federal regulations on the development of mariculture is discussed from a legal and institutional viewpoint. The potential for growth of mariculture is considered questionable without regulatory reforms, particularly at the federal level.

80-000031 Otte, G.; Rosenthal, H. MANAGEMENT OF A CLOSED BRACKISH WATER SYSTEM FOR HIGH-DENSITY FISH CULTURE BY BIOLOGICAL AND CHEMICAL WATER TREATMENT. Aquaculture 18 (2): 169-181. Oct. 1979. SFA 25(1)

[Biol. Anst. Helgoland, Zentiale Hamburg, Palmaille 9, D-2000 Hamburg 50, West Germany] During a 1-year operation of a warm water recycling system (salinity about 8 °/oo) sufficient water quality was maintained under high stocking density conditions using /Tilapia/ and the European eel as potential candidates for intensive farming. The final fish: water ratio was 1:23 (or 43.5 g fish per 1 water) for the whole experimental culture unit. The total water volume of the system was about 5 $m^3$. The water treatment unit held 52 percent of the total volume, whereby 46 percent was available for fish culture. Combined biological (trickling filter with Hydropack-foil) and chemical (ozonation) water treatment proved to be useful to meet water quality requirements under these rearing conditions. After an initial conditioning period of the biofilter, BOD varied from 4.5 to 6.0 mg O(2)/l, ammonium levels were maintained at less than 1 mg/l and nitrite concentrations averaged 1 mg/l. The average efficiency (oxidation rate) of the biofilter for NH(4)+- and NO(2)--oxidation was 31 percent and 13.2 percent, respectively. The pH was stabilized slightly above 7.0 when a denitrification unit was connected to the system. Nitrate concentration of the system levelled off between 200 and 400 mg/l and was regulated by the addition of an electron donator (first glucose solution, then methanol) to the denitrificaiton unit; the elimination rate averaged 50 percent with a maximum of 98 percent. High nitrite levels were avoided by ozone treatment of the recycled water. The accumulation of low-biodegradable substances was also successfully counteracted by ozonation. Fish growth rates of about 30 percent per month at high stocking densities were reached for /Tilapia/ at a fish:water ratio of 1:4.6 (217 g fish per 1 water), indicating that a combination of biological water treatment and ozonation supports intensive fish culture in a closed aquaculture system.

## FEEDS, FEEDING AND NUTRITION

80-000032 Austreng, E.; Refstie, T. EFFECT OF VARYING DIETARY PROTEIN LEVEL IN DIFFERENT FAMILIES OF RAINBOW TROUT. Aquaculture 18 (2): 145-156. Oct. 1979. SFA 25(1)

[Dep. Poultry Fur Anim. Sci., Agric. Univ. Norway, 1432 As-NLH, As, Norway] Groups of rainbow trout (/Salmo gairdneri/) fingerlings from five different families and five inbred groups were fed for 153 days on each of four diets similar in energy content, but differing in their percentage of protein. The protein contents were 24, 33, 42 and 51 percent, respectively. Significant differences between fish families were found for growth, condition factor, chemical composition of the carcass, and digestibility of protein. At the end of the experiment, interaction between diet fed and family was found close to significance for weight and relative growth rate, and significant for length and condition factor. This interaction indicates that prospects for selectively breeding strains of rainbow trout specifically better able to utilize protein are promising. Fish growth rate increased with increasing dietary protein content. The corresponding conditon factor, content of dry matter and energy in the carcass decreased. The high protein diets gave more protein in the carcass and a more discoloured liver than the low protein diets. Apparent protein digestibility increased with increasing protein level.

80-000033 Bergot, F. CARBOHYDRATE IN RAINBOW TROUT DIETS: EFFECTS OF THE LEVEL AND SOURCE OF CARBOHYDRATE AND THE NUMBER OF MEALS ON GROWTH AND BODY COMPOSITION. Aquaculture 18 (2): 157-167. Oct. 1979. SFA 25(1)

[Inst. Natl. Rech. Agron., Lab. Nutr. Poissons, Cent. Rech. Hydrobiol., Saint Pee-sur-Nivelle, 6431 Ascain, France] Isonitrogenous rations containing various levels of digestible carbohydrate were fed to groups of trout for 8 weeks. Two levels (15 or 30 percent) and two sources (glucose or starch) of carbohydrates were used. A given amount of 30 percent glucose diet was distributed in either 2, 4 or 6 meals/day, to determine the effect of meal frequency. Growth, feed efficiency and body composition of the different groups were compared. Glycaemia levels, as influenced by the different dietary treatments, were measured immediately and 6 h after a given meal. The 30 percent glucose diet promoted the best weight gain, feed conversion and protein efficiency. Groups fed the 15 percent glucose diet gave values between those of 30 percent glucose and the 30 percent starch-fed groups. The additional energy retained in groups fed the highest glucose level (30 percent) did not modify carcass composition but increased fat deposits in the viscera and glycogen in the liver. Plasma glucose levels indicated that the regulation of glycaemia is effective within a 24-h period, even after a daily intake of 550 mg glucose/100 g body weight. Increasing the number of meals had no discernible effect, the efficiency of the 30 percent glucose diet being the same in the various groups. It is concluded that, under certain experimental conditions, trout can tolerate up to 30 percent glucose in the diet and can use it for energy needs.

80-000034 Bergot, F. EFFECTS OF DIETARY CARBOHYDRATES AND OF THEIR MODE OF DISTRIBUTION ON GLYCAEMIA IN RAINBOW TROUT (/SALMO GAIRDNERI/ RICHARDSON). Comp. Biochem. Physiol. A Comp. Physiol. 64 (4): 543-547. 1979. SFA 25(1)

[Lab. Nutr. Poissons, Cent. Rech. Hydrobiol., I.N.R.A., B.P. 3, Saint Pee sur Nivelle, 64310 Ascain, France]

80-000035 Chervinski, J.; Lahav, M. FRESH WATER FEED OF YOUNG EUROPEAN SEA BASS (/DICENTRARCHUS LABRAX/ L.). Bamidgeh 31 (2): 44-48. June 1979. SFA 25(1)

[Fish Aquacult. Res. Stn., Dor, Israel]

80-000036 Choubert, G., Jr.; Luquet, P. INFLUENCE DE L'AGGLOMERATION ET DU STOCKAGE DES ALIMENTS COMPOSES SUR LEUR TENEUR EN CANTHAXANTHINE: CONSEQUENCES SUR LA DIGESTIBILITE ET LA FIXATION DE CE PIGMENT CHEZ LA TRUITE ARC-EN-CIEL. [CANTHAXANTHIN CONTENT OF FEED CONCENTRATES AS AFFECTED BY PELLETING AND STORAGE PROCESSES: CONSEQUENCES ON DIGESTIBILITY AND PIGMENTATION OF THE RAINBOW TROUT.] Ann. Zootech. 28 (2): 145-157. 1979. In French with English summ. SFA 25(1)

[Lab. Nutr. Poissons, I.N.R.A., St-Pee-sur-Nivelle, 64310 Ascain, France]

80-000037 Dabrowska, H.; Grudniewski, C.; Dabrowski, K. ARTIFICIAL DIETS FOR COMMON CARP: EFFECT OF THE ADDITION OF ENZYME EXTRACTS. Prog. Fish-Cult. 47 (4): 196-200. Oct. 1979. SFA 25(1)
[Inst. Ichthyobiol. Fish., Acad. Agric. Technol., Olsztyn, Poland]

80-000038 Dabrowski, K.; Kozak, B. THE USE OF FISH MEAL AND SOYABEAN MEAL AS A PROTEIN SOURCE IN THE DIET OF GRASS CARP FRY. Aquaculture 18 (2): 107-114. Oct. 1979. SFA 25(1)
[Inst. Ichthyol. Fish., Acad. Agric. Technol., 10-957 Olsgtyn-Kortavo, Poland] Diets based on fish meal and soyabean meal were fed to grass carp fry, the average body weight of each individual being 0.4 g. During the 70 days of the experiment, the best results were obtained with a diet containing 40 percent fish meal, when growth increment, protein efficiency ratio and apparent net protein utilization amounted to 209, 1.26 and 20.3 respectively. There was a deficiency in sulphuric amino acids in both fish meal- and soyabean meal-containing diets, and this was particularly marked in the latter. A significant decrease in available lysine was found in the diets containing soyabean meal. The main reason for the retardation in fish growth and the reduction of protein utilization when soyabean meal content is increased in the diets, seemed to be that the destruction of anti-nutritional factors by the heat processing of the meal was only partial.

80-000039 Fedorov, K. Ye.; Bogdanova, L. S. THE GROWTH AND DEVELOPMENT OF THE LARVAE OF THE PINK SALMON, /ONCORHYNCHUS GORBUSCHA/, UNDER DIFFERENT TEMPERATURE AND FEEDING REGIMES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 568-576. 1978. SFA 25(1)
[Dep. Ichthyol. Hydrobiol., Leningrad Univ., USSR] Growth, development and state of the digestive system of the larvae of the pink salmon, /Oncorhynchus gorbuscha/, was studied during the time of mixed feeding and with different combinations of two factors: temperature (5-6° and 10-11°) and retardation of the start of feeding by 15, 30, 45 and 60 days.

80-000040 Greenland, D. C.; Gill, R. L. MULTIPLE DAILY FEEDINGS WITH AUTOMATIC FEEDERS IMPROVE GROWTH AND FEED CONVERSION RATES OF CHANNEL CATFISH. Prog. Fish-Cult. 41 (3): 151-153. July 1979. SFA 25(1)
[U.S. FWS, Fish Farm. Exp. Stn., P.O. Box 860, Stuttgart, AR 72160]

80-000041 Howell, B. R. EXPERIMENTS ON THE REARING OF LARVAL TURBOT, /SCOPHTHALMUS MAXIMUS/ L. Aquaculture 18 (3): 215-225. Nov. 1979. SFA 25(1)
[Minist. Agric. Fish. Food, Fish. Lab., Lowestoft, Suffolk, England] Experiments on the live food requirements of cultured turbot larvae are described. A mixture of six species of unicellular algae did not sustain early larvae, but the growth and survival of larvae fed with rotifers were considerably improved when the rotifers were feeding on /Isochrysis galbana/ rather than on /Dunaliella tertiolecta/. Oyster (/Crassostrea gigas/) larvae offered alone or with rotifers, did not produce higher larval growth or survival than rotifers alone. Black tanks were found to be more suitable than white tanks for rearing larval turbot.

80-000042 Imada, O.; Kageyama, Y.; Watanabe, T.; Kitajima, C.; Fujita, S.; Yone, Y. [DEVELOPMENT OF A NEW YEAST AS A CULTURE MEDIUM FOR LIVING FEEDS USED IN THE PRODUCTION OF FISH SEED.] Bull. Jpn. Soc. Sci. Fish. 45 (8): 955-959. Aug. 1979. In Japanese with English summ. SFA 25(1)
[Kyowa Hakko Kagyo Co., Ltd., Ohtemachi, Chiyoda-ku, Tokyo 100, Japan]

80-000043 Kilambi, R. V.; Robison, W. R. EFFECTS OF TEMPERATURE AND STOCKING DENSITY ON FOOD COMSUMPTION AND GROWTH OF GRASS CARP /CTENOPHARYNGODON IDELLA/, VAL. J. Fish Biol. 15 (3): 337-342. Sept. 1979. SFA 25(1)
[Dep. Zool., Univ. Ark., Fayetteville 72701] Grass carp were raised in 227 l indoor tanks at 12.8, 18.3, 23.9 and 29.4°C temperatures, each experimental condition received five fish. Five grass carp were also raised in a 1135 l tank maintained at 29.4°C representing low stocking density (29.4°C-L). Food consumption, food conversion, and growth of carp were not different among the 18.3, 23.9, and 29.4°C experimental conditions with identical stocking density. The least growth and food consumption were noted for the fish at the 12.8°C temperature. The fish at the low stocking density had the best growth and maximum food consumption.

80-000044 Mac, M. J.; Nicholson, L. W.; McCauley, C. A. PCBS AND DDE IN COMMERCIAL FISH FEEDS. Prog. Fish-Cult. 47 (4): 210-211. Oct. 1979. SFA 25(1)
[U.S. FWS, Great Lakes Fish. Lab., 1451 Green Rd., Ann Arbor, MI 48105]

80-000045 Mazid, M. A.; Tanaka, Y.; Katayama, T.; Rahman, M. A.; Simpson, K. L.; Chichester, C. O. GROWTH RESPONSE OF /TILAPIA ZILLII/ FINGERLINGS FED ISOCALORIC DIETS WITH VARIABLE PROTEIN LEVELS. Aquaculture 18 (2): 115-122. Oct. 1979. SFA 25(1)
[Dep. Fish. Technol., Bangladesh Agric. Univ., Mymensingh, Bangladesh] Six purified casein diets within a range of 21-53 percent crude protein were fed for 3 weeks to young tilapia (/Tilapia zillii/) to determine the optimum protein requirement and protein: energy ratio for growth. Growth rate increased proportionally to protein level of the diet to an incorporation rate of about 35 percent. Beyond this a gradual retardation in growth rate was observed. The diet containing about 30 percent crude protein with a protein: energy (P/E) ratio of 81, however, appeared to be more efficiently utilized by the fish in terms of protein deposition and energy retention than diets with higher levels of crude protein. These results indicate that /Tilapia zillii/ requires about 35 percent protein in the diet for optimum growth while 30 percent for the maximum bodily protein deposition when casein is used as the sole source of protein. All six diets, however, showed an excellent feed conversion. Protein efficiency ratio (PER) decreased with the increase in protein in the diet.

80-000046 Murray, M. W.; Andrews, J. W. CHANNEL CATFISH: THE ABSENCE OF AN EFFECT OF DIETARY SALT ON GROWTH. Prog. Fish-Cult. 41 (3): 155-156. July 1979. SFA 25(1)
[Univ. Ga. Coll. Agric., Coastal Plain Stn., P.O. Box 13687, Savannah 31406]

80-000047 Ogino, C.; Yang, G.-Y. [REQUIREMENT OF CARP FOR DIETARY ZINC.] Bull. Jpn. Soc. Sic. Fish. 45 (8): 967-969. Aug. 1979. In Japanese with English summ. SFA 25(1)

[Lab. Fish Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo 108, Japan] Carp weighing 1.9 g and 1.5 g on the average were fed purified diets containing different amounts of zinc for 12 and 16 weeks, respectively. The rearing water contained zinc at a level of 10 ug per l. Dietary zinc levels were found to affect not only the appetite, growth rate, and mortality of the carp, but also the levels of zinc, iron, and copper in the tissues. The fish fed the diet containing 1 ppm zinc suffered from erosion of the skin and the fins. The requirement of carp for dietary zinc was proved to be 15 to 30 ppm of the dry diet under the present experimental conditions.

80-000048 Pfeffer, E.; Meske, C. H. UNTERSUCHUNGEN ZUR ERMITTLUNG DES BEDARFS AN MINERALISCHEN MENGENELEMENTEN VON SPIEGELKARPFEN (/CAPRINUS CARPIO/). [DERIVING REQUIREMENTS OF MAJOR MINERAL ELEMENTS IN CARP (/CAPRINUS CARPIO/).] J. Anim. Physiol. Anim. Nutr. 42 (5): 225-231. Nov. 1979. In German with English summ. SFA 25(1)

[Inst. Tierernahrung, Univ. Bonn, West Germany] Carp (/Cyprinus carpio/) weighing on average 100 g at the beginning of the trial were fed a diet of 30 percent casein, 10 percent oil and more than 50 percent gelatinized starch. Between 0 and 8 percent ash of fish meal were included as the only source of minerals. Feed conversion and retention of minerals showed no differences due to differences in dietary mineral content.

80-000049 Reddy, S. R.; Katre, S. GROWTH RATE AND CONVERSION EFFICIENCY OF THE AIR-BREATHING CATFISH, /HETEROPNEUSTES FOSSILIS/, IN RELATION TO RATION SIZE. Aquaculture 18 (1): 35-40. Sept. 1979. SFA 25(1)

[Dep. Zool., Bangalore Univ., Bangalore 560001, India] Effects of different feeding rates (0-20 percent live body weight) on food intake, growth and conversion efficiency of /Heteropneustes fossilis/ were studied using the oligochaete worm /Tubifex tubifex/ as food. An amount of worm substance equivalent to 12.73 percent live body weight/fish day$^{-1}$ represents the maximum amount which a 4.015 ± 0.340 g /H. fossilitis/ can consume under laboratory conditions. Geometrically derived feeding rations of 12, 40 and 130 mg/g live fish day$^{-1}$ represent the maintenance, optimum and maximum levels for /H. fossilis/. the SDA (specific dynamic action) increased from 14 mg/g day$^{-1}$ at optimum to 70 mg/g day$^{-1}$ at maximum feeding rate.

80-000050 Sakamoto, S.; Yone, Y. MINERAL MIXTURE IN PURIFIED DIET FOR RED SEA BREAM. Bull. Jpn. Soc. Sci. Fish. 45 (7): 873-877. July 1979. SFA 25(1)

[Fish. Res. Lab., Kyushu Univ., Tsuyasaki, Fukuoka 811-33, Japan]

80-000051 Scott, A. P.; Middleton, C. UNICELLULAR ALGAE AS A FOOD FOR TURBOT (/SCOPHTHALMUS MAXIMUS/ L.) LARVAE--THE IMPORTANCE OF DIETARY LONG-CHAIN POLYUNSATURATED FATTY ACIDS. Aquaculture 18 (3): 227-240. Nov. 1979. SFA 25(1)

[Minist. Agric. Fish. Food, Fish. Lab., Lowestoft, Suffolk, England] The production of juvenile turbot in research and commercial practice still involves the use of live foods for the early larvae. The rotifer /Brachionus plicatilis/ is used for the first few days followed by nauplii of the brine shrimp, /Artemia salina/. During this live food phase, the addition of live unicellular algae to the rearing tanks improves the growth and survival of the turbot larvae. Within 10 days

80-000051 CONTINUED
of the start of feeding, large differences in growth rate become apparent depending on the presence or absence of particular algae. The use of /Dunaliella tertiolecta/ in particular results in stunted growth and high mortalities. Evidence is presented in this paper that /Dunaliella tertiolecta/ is not toxic, and that its failure to support turbot larval growth is probably due to a deficiency of long-chain polyunsaturated fatty acids. These compounds have been shown by other workers to be an essential dietary requiremnt in O-group turbot.

80-000052 Smith, C. E.; Osborne, M. D.; Piper, R. G.; Dwyer, W. P. EFFECT OF DIET COMPOSITION ON PERFORMANCE OF RAINBOW TROUT BROOD STOCK DURING A THREE-YEAR PERIOD. Prog. Fish-Cult. 47 (4): 185-188. Oct. 1979. SFA 25(1)
[U.S. FWS, Fish Cult. Dev. Cent., Bozeman, MT 59715]

80-000053 Steffens, W.; Albrecht, M.-L. ERNIEDRIGUNG DES ANTEILS VON TIERISCHEM PROTEIN IM FUTTER FUER REGENBOGENFORELLEN (/SALMO GAIRDNERI/). 2. MITTEILUNG. ERGAENZUNG DURCH METHIONIN UND LYSIN. [REDUCING THE PROPORTION OF ANIMAL PROTEIN IN FEED FOR RAINBOW TROUT (/SALMO GAIRDNERI/). 2. SUPPLEMENTATION OF METHIONINE AND LYSINE.] Arch. Tierernaehr. 29 (5): 339-347. May 1979. In German with English and Russian summ. SFA 25(1)
[Inst. Binnenfisch., Berlin, Germany]

80-000054 Takeuchi, T.; Watanabe, T.; Ogino, C. [AVAILABILITY OF CARBOHYDRATE AND LIPID AS DIETARY ENERGY SOURCES FOR CARP.] Bull. Jpn. Soc. Sci. Fish. 45 (8): 977-982. Aug. 1979. In Japanese with English summ. SFA 25(1)
[Lab. Fish Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo 108, Japan]

80-000055 Takeuchi, T.; Watanabe, T.; Ogino, C. [OPTIMUM RATIO OF DIETARY ENERGY TO PROTEIN FOR] Bull. Jpn. Soc. Sci. Fish. 45 (8): 983-987. Aug. 1979. In Japanese with English summ. SFA 25(1)
[Lab. Fish Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo 108, Japan]

TRANSPORTING FISH

80-000056 Aldrin, J. F.; Messager, J. L.; Mevel, M. ESSAI SUR LE STRESS DE TRANSPORT CHEZ LE SAUMON COHO JUVENILE (/ONCORHYNCHUS KISUTCH/). [A STUDY OF TRANSPORT STRESS IN JUVENILE COHO SALMON (/ONCORHYNCHUS KISUTCH/).] Aquaculture 17 (4): 279-289. Aug. 1979. In French with English summ. SFA 25(1)
[Minist. Agric., B.P. 337, 29273 Brest Cedex, France] The mean values of eight blood parameters in a population of freshwater juvenile coho salmon were compared before and after transportation. All parameters were affected immediately following 3 h transportation with final hypoxia: haematrocrit, haemoglobin, total plasma protein, total cholesterol, and $Na^+$ increased. $Cl^-$ and $K^+$ decreased. The mean glucose value was not greatly modified; however, some individuals showed very high values, while others showed very low values. This peculiar finding may be due to the low nutritional level of the population (hypoglycaemic individuals probably having exhausted their glycogen stores). After 8 days the parameters had returned to their initial levels, with the exception of $Na^+$ and chlolesterol. Identical

80-000056 CONTINUED
results were found 1 month later. Following a formalin-malachite green bath treatment, parameter modification resembled that observed after transportation except for $Na^+$ and $K^+$, which remained relatively unchanged.

MISCELLANEOUS CULTURE TECHNIQUES AND EQUIPMENT

80-000057 Allen, S. K., Jr.; Stanley, J. G. POLYPLOID MOSAICS INDUCED BY CYTOCHALASIN B IN LANDLOCKED ATLANTIC SALMON /SALMO SALAR/. Trans. Am. Fish. Soc. 108 (5): 462-466. Sept. 1979. SFA 25(1)
[Me. Coop. Fish. Res. Unit, Univ. Me., Orono 04469]

80-000058 Choubert, G., Jr. TENTATIVE UTILIZATION OF SPIRULIN ALGAE AS A SOURCE OF CAROTENOID PIGMENTS FOR RAINBOW TROUT. Aquaculture 18 (2): 135-143. Oct. 1979. SFA 25(1)
[Cent. Rech. Hydrobiol., INRA, Lab. Nutr. Poissons, B.P. 3, Saint Pee-sur-Nivelle, 64310 Ascain, France]

80-000059 Fagerlund, U. H. M.; McBride, J. R.; Stone, E. T. A TEST OF 17 ALPHA-METHYLTESTOSTERONE AS A GROWTH PROMOTER IN A COHO SALMON HATCHERY. Trans. Am. Fish. Soc. 108 (5): 467-472. Sept. 1979. SFA 25(1)
[Resour. Serv. Br., Dep. Fish. Oceans, Vancouver, BC V7V 1N6, Canada]

80-000060 Geving, S. A.; Bathel, D. D. EFFICIENT TOOL FOR SEPARATING LIVE SALMONID SAC FRY FROM DEAD EGGS AND FRY. Prog. Fish-Cult. 47 (4): 195. Oct. 1979. SFA 25(1)
[Minn. Dep. Nat. Resour., French River Coldwater Hatchery, 10033 North Shore Dr., Duluth, MN 55804]

80-000061 Goetz, F. W.; Donaldson, E. M.; Hunter, G. A.; Dye, H. M. EFFECTS OF ESTRADIOL-17 BETA AND 17 ALPHA-METHYLTESTOSTERONE ON GONADAL DIFFERENTIATION IN THE COHO SALMON, /ONCORHYNCHUS KISUTCH/. Aquaculture 17 (4): 267-278. Aug. 1979. SFA 25(1)
[Dep. Biol., Univ. Notre Dame, Notre Dame, IN 46556] Methods are described for controlling sex differentiation in the coho salmon, /Oncorhynchus kisutch/. Eyed eggs and alevins were immersed in solutions of estradiol-17 beta and 17 alpha-methyltestosterone and fed these steroids in the diet for a period of 10 weeks postswim-up. In seven out of 10 groups that received estradiol all fish resembled normal females when sampled at 4 months posthatch. In fish treated with methyltestosterone at all except the lowest dose (25 and 50 ug/l) the gonads resembled neither normal males nor normal females; these gonads were composed largely of connective tissue with only occasional germ cells. Various proportions of male, female and intersex gonads were observed in groups which received androgen or estrogen only in the diet. The implications of the work for salmon culture include the production of sterile fish and increasing the proportion of female salmon in hatchery populations.

80-000062 Plichta, E. H.; Pratschner, G. A. CLEANING RACEWAYS WITH A CONCRETE GRINDER. Prog. Fish-Cult. 41 (3): 140-141. July 1979. SFA 25(1)
[Wolf Creek Natl. Fish. Hatchery, Jamestown, KY 42629]

80-000063 Shafland, P. L.; Davis, J. W.; Koehl, D. H. METHOD FOR COLLECTING ZOOPLANKTON FOR FEEDING LARVAL FISHES. Prog. Fish-Cult. 47 (4): 204-205. Oct. 1979. SFA 25(1)
[Fla. Game Fresh Water Fish Comm., Boca Raton 33431]

80-000064 Spanier, E. EXPERIMENTS IN REPELLING NIGHT HERONS FROM FISH PONDS BY THE USE OF DISTRESS CALLS. Proc. Sci. Conf. Isr. Ecol. Soc. 10: C1-C18. June 1979. SFA 25(1)
[Inst. Evol., Univ. Haifa, Haifa, Israel]

## GENERAL LIMNOLOGY AND OCEANOGRAPHY

80-000065 Jonasson, P. M. , (ed.) ECOLOGY OF EUTROPHIC, SUBARCTIC LAKE MYVATN AND THE RIVER LAXA. Oikos 32 (1/2): 1-308. 1979. SFA 25(1)
[Freshwater Biol. Lab., Univ. Copenhagen, Hillerod, Denmark] A collection of 19 papers.

80-000066 Stockner, J. G.; Shortreed, K. S. LIMNOLOGICAL STUDIES OF 13 SOCKEYE SALMON (/ONCORHYNCHUS NERKA/) NURSERY LAKES IN BRITISH COLUMBIA, CANADA. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 865. iv + 125p. Feb. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Pac. Environ. Inst., 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada]

## PHYSICAL LIMNOLOGY AND OCEANOGRAPHY

80-000067 Cook, S. K.; Crist, R. W. ESTIMATES OF BOTTOM TEMPERATURE FROM FISH CAPTURED IN LOBSTER TRAPS. Mar. Fish. Rev. 41 (8): 23-25. Aug. 1979. SFA 25(1)
[NMFS, R.R. 7, South Ferry Rd., Narragansett, RI 02882] Preliminary field experiments have shown that the internal body temperature of fish captured in lobster traps is a reasonable indicator of actual bottom temperature if the internal temperature is measured by insertion of a thermistor through the anal vent as soon as the fish is brought on deck, and if the fish captured are over 65 cm (approximately 25 inches) in length. Fish as small as 32 cm (approximately 12.5 inches) can be utilized provided they are caught in isothermal or shallow water (less than 40 m) which involves a short hauling time to the surface. This procedure provides fishermen with an inexpensive technique for determining bottom temperatures.

CHEMICAL LIMNOLOGY AND OCEANOGRAPHY

80-000068 Peters, R. H. CONCENTRATIONS AND KINETICS OF PHOSPHORUS FRACTIONS ALONG THE TROPHIC GRADIENT OF LAKE MEMPHREMAGOG. J. Fish. Res. Board Can. 36 (8): 970-979. Aug. 1979. In English with French summ. SFA 25(1)
[Dep. Biol., McGill Univ., 1205 Ave. Docteur Penfield, Montreal, PQ H3A 1B1, Canada]

80-000069 Prokopowich, J. CHEMICAL CHARACTERIZATION OF EPILIMNION WATERS IN THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 873. iv + 41p. Aug. 1979. In English with French summ. SFA 25(1)
[Fish. Mar. Serv., Winnipeg, MB R3T 2N6, Canada]

BENTHOS

80-000070 Wildish, D. J.; Kristmanson, D. D. TIDAL ENERGY AND SUBLITTORAL MACROBENTHIC ANIMALS IN ESTUARIES. J. Fish. Res. Board Can. 36 (10): 1197-1206. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

PLANKTON

80-000071 Costella, A. C.; Shortreed, K. S.; Stockner, J. G. PHYTOPLANKTON FRACTIONATION STUDIES IN GREAT CENTRAL LAKE, BRITISH COLUMBIA: A NUTRIENT-ENRICHED SOCKEYE SALMON (/ONCORHYNCHUS NERKA/) NURSERY LAKE. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 880. iv + 27p. May 1979. In English with French summ. SFA 25(1)
[Fish. Mar. Serv., 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada]

80-000072 Potter, D. S. THE ZOOPLANKTON OF FLATHEAD LAKE: AN HISTORICAL REVIEW WITH SUGGESTIONS FOR CONTINUING LAKE RESOURCE MANAGEMENT. Ph.D. dissertation, Univ. Mont. 388p. 1978. From Diss. Abstr. Int. B Sci. Eng. 40(3):1058. Sept. 1979. SFA 25(1)

MORPHOLOGY

80-000073 Batten, T. F. C.; Ingleton, P. M.; Ball, J. N. ULTRASTRUCTURAL AND FORMALDEHYDE-FLUORESCENCE STUDIES ON THE HYPOTHALAMUS OF /POECILIA LATIPINNA/ (TELEOSTEI, CYPRINODONTIFORMES). Gen. Comp. Endocrinol. 39 (1): 87-109. Sept. 1979. SFA 25(1)
[Dep. Zool., Univ. Sheffield, Western Bank, Sheffield S10 2TN, South Yorkshire, England]

80-000074 Berg, R. E. EXTERNAL MORPHOLOGY OF THE PINK SALMON, /ONCORHYNCHUS GORBUSCHA/, INTRODUCED INTO LAKE SUPERIOR. J. Fish. Res. Board Can. 36 (10): 1283-1287. Oct. 1979. In English with French summ. SFA 25(1)
[Tribal Fish. Biol., P.O. Box 625, Sault Ste. Marie, MI 49783]

80-000075 Berge, P. I. THE CARDIAC ULTRASTRUCTURE OF /CHIMAERA MONSTROSA/ L. (ELASMOBRANCHII: HOLOCEPHALI). Cell Tissue Res. 201 (2): 181-195. 3 Sept. 1979. SFA 25(1)
[Cell. Cardiol. Res. Group, Zool. Lab., Univ. Bergen, Norway]

80-000076 Borkhvardt, V. G. ON THE NATURE OF VERTEBRAL ARCHES IN LAMPREYS (PETROMYZONIDAE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 677-682. 1978. SFA 25(1)
[Dep. Vert. Zool., Leningrad Univ., USSR]

80-000077 Branson, B. A. OBSERVATIONS ON THE GROSS ANATOMY OF THE OLFACTORY ORGAN AND EYES IN FIVE GENERA OF AMERICAN BARBELED MINNOWS (PISCES: CYPRINIDAE). Southwest. Nat. 24 (3): 501-507. 15 Sept. 1979. SFA 25(1)
[Dep. Biol. Sci., East. Ky. Univ., Richmond 40475] The gross morphology of the olfactory organ and eye size in 5 genera and 15 species of barbeled cyprinid fishes was analyzed morphometrically. Large size of nostrils and large number of olfactory lamellae are correlated with turbid or silty habitats, whereas smaller nostrils and fewer lamellae are characteristic clear-water species. There does not appear to be much correlation between the size of the olfactory organ and habitat. No species-specific correlation between eye size and habitat was discerned, and there is no apparent correlation between eye size and extent of development in the olfactory organ.

80-000078 Branson, B. A. VARIATION IN THE OLFACTORY ORGAN IN /HYBOPSIS AESTIVALIS/ (PISCES: CYPRINIDAE). Trans. Ky. Acad. Sci. 40 (3/4): 112-121. Sept. 1979. SFA 25(1)
[Dep. Biol. Sci., East. Ky. Univ., Richmond 40475]

80-000079 Breucker, H.; Zeiske, E.; Melinkat, R. DEVELOPMENT OF THE OLFACTORY ORGAN IN THE RAINBOW FISH /NEMATOCENTRIS MACCULLOCHI/ (ATHERINIFORMES, MELANOTAENIIDAE). Cell Tissue Res. 200 (1): 53-68. 3 Aug. 1979. SFA 25(1)
[Abt. Mikrosk. Anat., Anat. Inst. Univ., Martinistr. 52, D-2000 Hamburg 20, West Germany]

80-000080 Buynak, G. L.; Mohr, H. W., Jr. LARVAL DEVELOPMENT OF CREEK CHUB AND FALLFISH FROM TWO SUSQUEHANNA RIVER TRIBUTARIES. Prog. Fish-Cult. 41 (3): 124-129. July 1979. SFA 25(1)
[Ichthyological Assoc., Inc., R.D. 1, Berwick, PA 18603]

80-000081 Buynak, G. L.; Mohr, H. W., Jr. LARVAL DEVELOPMENT OF THE NORTHERN PIKE (/ESOX LUCIUS/) AND MUSKELLUNGE (/ESOX MASQUINONGY/) FROM NORTHEAST PENNSYLVANIA. Proc. Pa. Acad. Sci. 53 (1): 69-73. 1979. SFA 25(1)

[Ichthyological Assoc., Inc., R.D. 1, Berwick, PA 18603] Northern pike (/Esox lucius/) eggs hatched 10 days after fertilization at a mean temperature of 10.9 C. Newly hatched larvae ranged from 7.9 to 8.5 mm total length (TL) (mean = 8.3 mm); standard length ranged from 7.8 to 8.4 mm (mean = 8.2 mm). Fin rays were visible in caudal, pectoral, dorsal, anal, and pelvic fins by 13.4, 15.9, 18.2, 18.2 and 19.2 mm TL, respectively. Transformation to the postlarval phase occurred by 13.2 mm TL and to the late postlarval phase by 19.1 mm TL. after fertilization at a mean temperature of 16.9 C. Newly hatched larvae ranged from 7.9 to 9.2 mm TL (mean = 8.7); standard length was only slightly smaller (less than 0.05 mm). Fin rays were visible in pectoral fins by 11.4 mm TL, dorsal, anal, and caudal fins by 17.4 mm TL, and in the pelvics by 21.8 mm TL. Transformation to the postlarval phase occurred by 14.4 mm TL, and to the late postlarval phase by 21.8 mm TL. Useful characteristics for distinguishing northern pike, muskellunge, and chain pickerel (/E. niger) larvae are preanal and total myomere counts, pigmentation, and snout length.

80-000082 Buynak, G. L.; Mohr, H. W., Jr. LARVAL DEVELOPMENT OF THE BLACKNOSE DACE (/RHINICHTHYS ATRATULUS/) AND LONGNOSE DACE (/RHINICHTHYS CATARACTAE/) FROM A SUSQUEHANNA RIVER TRIBUTARY. Proc. Pa. Acad. Sci. 53 (1): 56-60. 1979. SFA 25(1)

[Ichthyological Assoc., Inc., R.D. 1, Berwick, PA 18603] Eggs of the blacknose dace (/Rhinichthys atratulus/) hatched seven days after fertilization at a mean temperature of 18.5 C. Total length (TL) of newly hatched larvae ranged from 4.9 to 5.7 mm (mean = 5.5 mm) and standard length from 4.7 to 5.7 mm (mean = 5.2 mm). The newly hatched larvae had eyes that were pigmented around the outer margins, a few melanophores on the occipital region of the head, and two dorsal rows of melanophores from the occipital region to slightly beyond midbody. These larvae also had pectoral fin buds, straight urostyles, and incomplete mouths. Transformation to the postlarval phase occurred in larvae 7.2 mm TL and to the late postlarval phase by 14.5 mm TL. Eggs of the longnose dace (/R. cataractae/) hatched six days after fertilization at a mean temperature of 18.3 C. Total length of newly hatched larvae ranged from 5.8 to 6.0 mm (mean = 5.9 mm) and standard length from 5.6 to 5.8 mm (mean = 5.7 mm). The newly hatched larvae were unpigmented, had pectoral fin buds, straight urostyles, and incomplete mouths. Transformation to the postlarval phase occurred by 9.4 mm TL and to the late postlarval phase by 14.0 mm TL. Characteristics useful in distinguishing between blacknose and longnose dace are size, pigmentation, and preanal myomere number in prolarvae. Pigmentation patterns and mouth location can be used to separate older larvae.

80-000083 Christopher, W. E.; Linder, A. D. THE OSTEOCRANIUM OF THE CYPRINID FISH, /ACROCHEILUS ALUTACEUS/. Tebiwa (Misc. Pap. Idaho State Univ. Mus. Nat. Hist.) No. 16. 19p. 15 May 1979. SFA 25(1)

[Dep. Biol., Idaho State Univ., Pocatello 83201]

80-000084 de Souza, W.; Benchimol, M.; Somlo, C.; Machado, R. D.; Hasson-Voloch, A. CYTOCHEMISTRY AND FREEZE-FRACTURE OF MEMBRANES ISOLATED FROM THE ELECTROCYTE OF /ELECTROPHORUS ELECTRICUS/ (L.). Cell Tissue Res. 202 (2): 275-281. Nov. 1979. SFA 25(1)
[Inst. Biofis., Univ. Fed. Rio de Janeiro, Cidade Univ. 21.910, Rio de Janeiro, Brazil]

80-000085 Derivot, J. H.; Dupe, M.; Godet, R. ANATOMIC FONCTIONNELLE DE L'ORGANE OLFACTIF DE /PROTOPTERUS ANNECTENS/ OWEN (DIPNEUSTES): CONTRIBUTION A LA CONNAISSANCE DU MECANISME D'IRRIGATION DE L'ORGANE OLFACTIF. [FUNCTIONAL ANATOMY OF THE OLFACTORY ORGAN OF /PROTOPTERUS ANNECTENS/ OWEN (DIPNOI): CONTRIBUTION TO THE KNOWLEDGE OF THE MECHANISM OF WATER TRANSPORT THOUGH THE OLFACTORY ORGAN.] Acta Zool. (Stockh.) 60 (4): 251-257. 1979. In French with English summ. SFA 25(1)
[Lab. Neurophysiol., U.E.R. Sci., Nice Valrose, France]

80-000086 Desai, A. K. HISTOLOGICAL STUDIES OF THE LIVER OF MIGRATORY FISH, /HILSA ILISHA/ AND NON-MIGRATORY /HILSA TOLI/. J. Anim. Morphol. Physiol. 25 (1/2): 119-123. June-Dec. 1978. SFA 25(1)
[Dep. Zool., Fac. Sci., M.S. Univ. Baroda, Baroda, 390 002, India]

80-000087 Dobrinskaya, L. A. CORRELATIVE INCREASE IN BODY AND BRAIN WEIGHT IN JUVENILE CARP. Sov. J. Ecol. (Engl. Transl. Ekologiya) 9 (6): 566-569. July 1979. SFA 25(1)
[Inst. Plant Anim. Ecol., Urals Sci. Cent., Acad. Sci., USSR]

80-000088 Fouda, M. M. STUDIES ON SCALE STRUCTURE IN THE COMMON GOBY /POMATOSCHISTUS MICROPS/ KROYER. J. Fish Biol. 15 (2): 173-183. Aug. 1979. SFA 25(1)
[Al Azhar Univ., Fac. Sci., Zool. Dep., Nasr City, Cairo, Egypt]

80-000089 Geerlink, P. J. THE ANATOMY OF THE PECTORAL FIN IN /SAROTHERODON NILOTICUS/ TREWAVAS (CICHLIDAE). Neth. J. Zool. 29 (1): 9-32. Mar. 1979. SFA 25(1)
[Dep. Zool., Univ. Groningen, The Netherlands]

80-000090 Hirji, K. N.; Courtney, W. A. M. 'PEAR-SHAPED' CELLS IN THE DIGESTIVE TRACT OF THE PERCH /PERCA FLUVIATILIS/ (L.). J. Fish Biol. 15 (4): 469-472. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Dar es Salaam, P.O. Box 35064, Dar es Salaam, Tanzania]

80-000091 Kagawa, H.; Takano, K. [ULTRASTRUCTURE AND HISTOCHEMISTRY OF GRANULOSA CELLS OF PRE- AND POST-OVULATORY FOLLICLES IN THE OVARY OF THE MEDAKA, /ORYZIAS LATIPES/.] Bull. Fac. Fish. Hokkaido Univ. 30 (3): 191-204. Aug. 1979. In Japanese with English summ. SFA 25(1)
[Lab. Fresh-Water Fish-Cult., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

80-000092 Kemp, A. THE HISTOLOGY OF TOOTH FORMATION IN THE AUSTRALIAN LUNGFISH, /NEOCERATODUS FORSTERI/ KREFFT. Zool. J. Linn. Soc. 66 (3): 251-287. July 1979. SFA 25(1)
[Dep. Zool., Univ. Queensland, St. Lucia, Brisbane, Queensland 4067, Australia]

80-000093 Kendall, A. W., Jr. MORPHOLOGICAL COMPARISONS OF NORTH AMERICAN SEA BASS LARVAE (PISCES: SERRANIDAE). NOAA Tech. Rep. NMFS Circ. 428. iv + 50p. Aug. 1979. SFA 25(1)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

80-000094 Kendall, M. W.; Dale, J. E. SCANNING AND TRANSMISSION ELECTRON MICROSCOPIC OBSERVATIONS OF RAINBOW TROUT (/SALMO GAIRDNERI/) GILL. J. Fish. Res. Board Can. 36 (9): 1072-1079. Sept. 1979. In English with French summ. SFA 25(1)
[Dep. Anat., Sch. Med. Sci., Univ. Nev., Reno 89557]

80-000095 Leiby, M. M. LEPTOCEPHALUS LARVAE OF THE EEL FAMILY OPHICHTHIDAE. I. /OPHICHTHUS GOMESI/ CASTELNAU. Bull. Mar. Sci. 29 (3): 329-343. July 1979. SFA 25(1)
[Fla. Dep. Nat. Resour., Mar. Res. Lab., 100 8th Ave. S.E., St. Petersburg 33701] Two hundred fifty-five larvae of /Ophichthus gomesi/, comprising a developmental series from just hatched to metamorphic, are described. Osteological and morphological development is described and illustrated. A method of determining the number of adult precaudal vertebrae from the leptocephali is provided. This will allow more accuracy in leptocephalus-adult comparisons. Two morphologically distinct, premetamorphic stages of ophichthid leptocephali are named and described.

80-000096 Lewis, S. V. A SCANNING ELECTRON MICROSCOPE STUDY OF THE GILLS OF THE AIR-BREATHING CATFISH, /CLARIAS BATRACHUS/ L. J. Fish Biol. 15 (4): 381-384. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Malaya, Lembah Pantai, Kuala Lumpur, Malaysia] Using the scanning electron microscope, the gills of the air-breathing catfish, /Clarias batrachus/, have been studied. The overall morphology of the gills are similar to other teleosts. In contrast to water-breathing species, however, microridges are absent from the surfaces of the secondary lamellae and only short microvilli are present. Long, convoluted microridges are present on the epithelial cells of the gill filaments. The possible roles of these structures in relation to water flow are discussed.

80-000097 Liem, K. F. MODULATORY MULTIPLICITY IN THE FEEDING MECHANISM IN CICHLID FISHES, AS EXEMPLIFIED BY THE INVERTEBRATE PICKERS OF LAKE TANGANYIKA. J. Zool. (Lond.) 189 (1): 93-125. Sept. 1979. SFA 25(1)
[Mus. Comp. Zool., Harvard Univ., Cambridge, MA 02138]

80-000098 Lodi, E. VARIABILITY OF THE CANESTRINI'S ORGAN IN /COBITIS TAENIA/ L. (COBITIDAE, OSTEICHTHYES). Riv. It. Piscic. Ittiop. 14 (3): 81-88. July-Aug.-Sept. 1979. In English and Italian. SFA 25(1)
[Ist. Zool. Univ., Via Accad. Albertina, 17, 10123 Torino, Italy]

80-000099 Mallatt, J. SURFACE MORPHOLOGY AND FUNCTIONS OF PHARYNGEAL STRUCTURES IN THE LARVAL LAMPREY /PETROMYZON MARINUS/. J. Morphol. 162 (2): 249-274. Nov. 1979. SFA 25(1)
[Dep. Anat., Univ. Chicago, 1025 E. 57th St., Chicago, IL 60637]

80-000100 Markov, K. P. ADHESIVENESS OF EGG MEMBRANES IN STURGEONS (FAMILY ACIPENSERIDAE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 437-446. 1978. SFA 25(1)
[IEMEZh, USSR Acad. Sci., Moscow, USSR] Data are given on the adhesiveness of egg membranes of the Russian sturgeon, /Acipenser guldenstadti/, the beluga, /Huso huso/, and the sheap sturgeon, /Acipenser nudiventris/. The microstrucutre of the surface of the egg membranes was studied by the scanning electron microscope. The gelatinous layer of membrane of the mature egg has an adhesive surface and is capable of special movements by means of which this surface clings to the substrate. The swelling of the membranes intensifies the action of these factors, as a result, contact (areas of attachment) originate on the surface of the membrane, guaranteeing the firm attachment of the membrane to the substrate.

80-000101 Mattey, D. L.; Morgan, M.; Wright, D. E. DISTRIBUTION AND DEVELOPMENT OF RODLET CELLS IN THE GILLS AND PSEUDOBRANCH OF THE BASS, /DICENTRACHUS LABRAX/ (L). J. Fish Biol. 15 (3): 363-370. Sept. 1979. SFA 25(1)
[Sch. Environ. Sci., Plymouth Polytech., Devon, England]

80-000102 McNulty, J. A. A COMPARATIVE LIGHT AND ELECTRON MICROSCOPIC STUDY OF THE PINEAL COMPLEX IN THE DEEP-SEA FISHES, /CYCLOTHONE SIGNATA/ AND /C. ACCLINIDENS/. J. Morphol. 162 (1): 1-16. Oct. 1979. SFA 25(1)
[Dep. Anat., Loyola Univ. Stritch Sch. Med., 2160 S. First Ave., Maywood, IL 60153]

80-000103 Medvedeva-Vasil'yeva, Ye. D. INTRAPOPULATION VARIABILITY IN THE JAW AND SOME OTHER BONES OF THE SKULL IN THE CHAR, /SALVELINUS ALPINUS/, FROM BERING ISLAND (COMMANDER ISLANDS). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 362-376. 1978. SFA 25(1)
[Dep. Ichthyol., Moscow Univ., Moscow, USSR]

80-000104 Mittal, A. K.; Whitear, M. KERATINIZATION OF FISH SKIN WITH SPECIAL REFERENCE TO THE CATFISH /BAGARIUS BAGARIUS/. Cell Tissue Res. 202 (2): 213-230. Nov. 1979. SFA 25(1)
[M. Whitear: Dep. Zool., Univ. Coll., Gower St., London WC1E 6BT, England]

80-000105 Munz, H. MORPHOLOGY AND INNERVATION OF THE LATERAL LINE SYSTEM IN /SAROTHERODON NILOTICUS/ (L.) (CICHLIDAE, TELEOSTEI). Zoomorphologie 93 (1): 73-86. 1979. SFA 25(1)
[Fak. Biol., Univ. Bielefeld, Postfach 8640, D-4800 Bielefeld 1, West Germany]

80-000106 Myklebust, R.; Kryvi, H. ULTRASTRUCTURE OF THE HEART OF THE STURGEON /ACIPENSER STELLATUS/ (CHONDROSTEI). Cell Tissue Res. 202 (3): 431-438. Nov. 1979. SFA 25(1)
[H. Kryvi: Inst. Anat., Univ. Bergen, Arstadvollen 19, N-5000 Bergen, Norway]

80-000107 Nelson, J. S. SOME OSTEOLOGICAL DIFFERENCES BETWEEN THE BLENNIOID FISHES /LIMNICHTHYS POLYACTIS/ AND /L. RENDAHLI/, WITH COMMENTS ON OTHER SPECIES OF CREEDIIDAE. N.Z. J. Zool. 6(2): 273-277. June 1979. SFA 25(1)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

80-000108 Nosacek, I.; Nosacek, N.; Dropp, J. ARE MAST CELLS PRESENT IN THE LAMPREY (/LAMPETRA PLANERI/)? Proc. Pa. Acad. Sci. 53 (1): 106. 1979. SFA 25(1)
[Dep. Sci. Math., Mount Saint Mary's Coll., Emmitsburg, MD 21727]

80-000109 Olney, J. E.; Markle, D. F. DESCRIPTION AND OCCURRENCE OF VEXILLIFER LARVAE OF /ECHIODON/ (PISCES: CARAPIDAE) IN THE WESTERN NORTH ATLANTIC AND NOTES ON OTHER CARAPID VEXILLIFERS. Bull. Mar. Sci. 29 (3): 365-379. July 1979. SFA 25(1)
[Va. Inst. Mar. Sci., Gloucester Point 23062]

80-000110 Omura, Y. LIGHT AND ELECTRON MICROSCOPIC STUDIES ON THE PINEAL TRACT OF RAINBOW TROUT, /SALMO GAIRDNERI/. Rev. Can. Biol. 38 (2): 105-118. June 1979. SFA 25(1)
[Fish. Lab., Fac. Agric., Nagoya Univ., Chikusa, Nagoya, 464, Japan]

80-000111 Peek, W. D.; Sidon, E. W.; Youson, J. H.; Fisher, M. M. FINE STRUCTURE OF THE LIVER IN THE LARVAL LAMPREY, /PETROMYZON MARINUS/ L.; HEPATOCYTES AND SINUSOIDS. Am. J. Anat. 156 (2): 231-250. Oct. 1979. SFA 25(1)
[J. H. Youson: Dep. Zool., Scarborough Coll., Univ. Toronto, West Hill, ON M1C 1A4, Canada]

80-000112 Pickett, J. F. PUGHEADEDNESS IN A LARGEMOUTH BASS. N.Y. Fish Game J. 26 (1): 98-99. Jan. 1979. SFA 25(1)
[Burden Lake Rd., Averill Park, NY]

80-000113 Popper, A. N. ULTRASTRUCTURE OF THE SACCULUS AND LAGENA IN A MORAY EEL (/GYMNOTHORAX/ SP.). J. Morphol. 161 (3): 241-256. Sept. 1979. SFA 25(1)
[Dep. Anat., Georgetown Univ. Sch. Med. Dent., 3900 Reservoir Rd. NW, Washington, DC 20007]

80-000114 Schmidt, J. T. THE LAMINAR ORGANIZATION OF OPTIC NERVE FIBRES IN THE TECTUM OF GOLDFISH. Proc. R. Soc. Lond. B Biol. Sci. 205 (1159): 287-306. 1 Aug. 1979. SFA 25(1)
[Dep. Anat., Vanderbelt Univ. Med. Sch., Nashville, TN 37232]

80-000115 Schwerdtfeger, W. K. MORPHOMETRICAL STUDIES OF THE ULTRASTRUCTURE OF THE EPIDERMIS OF THE GUPPY, /POECILIA RETICULATA/ PETERS, FOLLOWING ADAPTATION TO SEAWATER AND TREATMENT WITH PROLACTIN. Gen. Comp. Endocrinol. 38 (4): 476-483. Aug. 1979. SFA 25(1)
[Max Planck-Inst., Hirnforsch. Deutschordenstr. 46, D-6000 Frankfort, West Germany] Adult male guppies adapted to seawater or fresh water were treated for a period of 4 weeks with different doses of prolactin. The epidermis of scales from the midlateral body region was studied by light and electron microscopy. Prolactin treatment of guppies adapted to fresh water changes the pattern of superficial ridges and increases the numbers of cell layers, mucous cells, and subepidermal capillaries. Adaptation to seawater increases the body surface, the surface extent of superficial cells, the number of small electron-dense vesicles, and the height of the glycocalyx. The most striking finding is the occurrence of chloride cells in the epidermis of all guppies adapted to seawater. The number of chloride cells is reduced after low and medium doses of prolactin, and increased following high doses.

80-000116 Schwerdtfeger, W. K. QUALITATIVE AND QUANTITATIVE DATA ON THE FINE STRUCTURE OF THE GUPPY (/POECILIA RETICULATA/ PETERS) EPIDERMIS FOLLOWING TREATMENT WITH THYROXINE AND TESTOSTERONE. Gen. Comp. Endocrinol. 38 (4): 484-490. Aug. 1979. SFA 25(1)
[Max Planck-Inst. Hirnforsch., Deutschordenstr. 46, D-6000 Frankfort, West Germany] The effects of thyroxine and testosterone on the epidermal fine structure of the guppy, /Poecilia reticulata/, are studied by morphometric methods. Treatment with low doses of thyroxine increases the numbers of mucous cells and of small electron-dense vesicles in superficial cells as well as the height of the glycocalyx. Following high doses of thyroxine and testosterone, the guppy epidermis undergoes degenerative changes such as flattening of the epidermal cells, reduction of the glycocalyx-producing organelles, and extreme interdigitation of adjacent superficial cells with reduction of the number of desmosomes.

80-000117 Sroczynski, S. UEBER EIN EINFACHES VERFAHREN ZUR MESSUNG DER BRENNWEITE DER FISCHKRISTALLINESEN. [A SIMPLE METHOD FOR MEASURING THE FOCAL LENGTH OF THE FISH CRYSTALLINE LENS.] Zool. Anz. 203 (1/2): 1-11. 1979. In German with English summ. SFA 25(1)
[Inst. Ichthyobiol. Beinnenfisch., Agrotech. Akad. Olsztyn, Poland]

80-000118 Stehr, C. M.; Hawkes, J. W. THE COMPARATIVE ULTRASTRUCTURE OF THE EGG MEMBRANE AND ASSOCIATED PORE STRUCTURES IN THE STARRY FLOUNDER, /PLATICHTHYS STELLATUS/ (PALLAS), AND PINK SALMON, /ONCORHYNCHUS GORBUSCHA/ (WALBAUM). Cell Tissue Res. 202 (3): 347-356. Nov. 1979. SFA 25(1)
[Environ. Conserv. Div., NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

80-000119 Sugimoto, Y.; Takahashi, H. ULTRASTRUCTURAL CHANGES OF TESTICULAR INTERSTITIAL CELLS OF SILVER JAPANESE EELS, /ANGUILLA JAPONICA/, TREATED WITH HUMAN CHORIONIC GONADOTROPIN. Bull. Fac. Fish. Hokkaido Univ. 30 (1): 23-33. Feb. 1979. SFA 25(1)
[Lab. Fresh-Water Fish-Cult., Fac. Fish, Hokkaido Univ., Hakodate, Japan]

80-000120 Suvorova, L. G.; Treshchuk, L. I. THE MORPHOLOGY AND HISTOCHEMISTRY OF THE ALIMENTARY CANAL OF THE BAIKAL OMUL, /COREGONUS AUTUMNALIS MIGRATORIUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 431-437. 1978. SFA 25(1)
[Cent. Res. Lab., Med. Inst., Irkutsk, USSR] The results of a histo-morphological study of the alimentary canal of the omul, /Coregonus autumnalis migratorius/, from the Northern Baikal, Posol'skoye and Selenga races are given. Histochemical methods were used for the investigation. A qualitative evaluation is given of the content of mucopolysaccharides in the epithelium and the connective tissue of the alimentary canal.

80-000121 Symmons, S. NOTOCHORDAL AND ELASTIC COMPONENTS OF THE AXIAL SKELETON OF FISHES AND THEIR FUNCTIONS IN LOCOMOTION. J. Zool. (Lond.) 189 (2): 157-206. Oct. 1979. SFA 25(1)
[21, Balgownie Rd., Bridge of Don, Aberdeen, Scotland]

80-000122 Ueda, H. EFFECT OF THIOUREA TREATMENT ON PITUITARY BASOPHILIC CELLS OF THE LOACH, /MISGURNUS ANGUILLICAUDATUS/. Bull. Fac. Fish. Hokkaido Univ. 30 (2): 116-123. May 1979. SFA 25(1)
[Lab. Fresh-Water Fish-Cult., Fac. Fish., Hokkaido Univ., Hokodate, Japan]

80-000123 van Hasselt, M. J. F. M. MORPHOLOGY AND MOVEMENTS OF THE JAW APPARATUS IN SOME LABRINAE (PISCES, PERCIFORMES). Neth. J. Zool. 29 (1): 52-108. Mar. 1979. SFA 25(1)
[Zool. Lab., Dep. Morphol., Univ. Leiden, The Netherlands]

80-000124 Wegner, N. T. THE ORIENTATION OF HAIR CELLS IN THE OTOLITHIC ORGANS AND THE PAPILLA NEGLECTA IN THE INNER EAR OF THE ANABANTIDE FISH /COLISA LABIOSA/ (DAY). Acta Zool. (Stockh.) 60 (4): 205-216. 1979. SFA 25(1)
[Zool. Lab., Univ. Aarhus, DK-8000 Aarhus, Denmark]

80-000125 Wilkins, N. P.; Jancsar, S. TEMPORAL VARIATIONS IN THE SKIN OF ATLANTIC SALMON /SALMO SALAR/ L. J. Fish Biol. 15 (3): 299-307. Sept. 1979. SFA 25(1)
[Natl. Univ. Ireland, Dep. Zool., Univ. Coll., Galway, Ireland] The thickness of the skin of Atlantic salmon increases throughout the first two years of life. This increase involves, principally, an increase in the connective tissue of the dermis, and occurs independently of sexual maturity. The concentration of mucous cells in the epidermis changes seasonally, being least during the winter period. No sexual dimorphism is observed in these features among sexually immature fish. The epidermis of precociously mature male parr is thicker and contains more mucous cells than that of sexually immature individuals.

80-000126 Yefremenko, V. N. A DESCRIPTION OF THE LARVAE OF /NOTOLEPIS COATSI/ (PARALEPIDIDAE, PISCES). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 500-504. 1978. SFA 25(1)
[VNIRO, Moscow, USSR]

80-000127 Zeiske, E.; Breucker, H.; Melinkat, R. GROSS MORPHOLOGY AND FINE STRUCTURE OF THE OLFACTORY ORGAN OF RAINBOW FISH (ATHERINIFORMES, MELANOTAENIIDAE). Acta Zool. (Stockh.) 60 (3): 173-186. 1979. SFA 25(1)
[Zool. Inst., Univ. Hamburg, West Germany]

PHYSIOLOGY

80-000128 Abrahamsson, T. PHENYLETHANOLAMINE-N-METHYL TRANSFERASE (PNMT) ACTIVITY AND CATECHOLAMINE STORAGE AND RELEASE FROM CHROMAFFIN TISSUE OF THE SPINY DOGFISH, /SQUALUS ACANTHIAS/. Comp. Biochem. Physiol. C Comp. Pharmacol. 64 (1): 169-172. 1979. SFA 25(1)
[Dep. Zoophysiol., Univ. Goteborg, Fack, 400 33 Goteborg, Sweden]

80-000129 Alabaster, J. S.; Shurben, D. G.; Mallett, M. J. THE SURVIVAL OF SMOLTS OF SALMON /SALMO SALAR/ L. AT LOW CONCENTRATIONS OF DISSOLVED OXYGEN. J. Fish Biol. 15 (1): 1-8. July 1979. SFA 25(1)
[Water Res. Cent., Stevenage Lab., Elder Way, Stevenage, Herts. SG1 1TH, England] The survival of Atlantic salmon smolts on sudden exposure to low constant concentrations of dissolved oxygen (DO) has been measured under laboratory conditions; the 3-d LC50 is about 3 mg $l^{-1}$ in freshwater and about 2.5 mg $l^{-1}$ in 30 percent and 80 percent 'sea water', even for fish acclimated for several days to low concentrations of DO and high salinity; median threshold concentrations of DO are probably close to 3.3 and 2.6 mg $l^{-1}$ respectively.

80-000130 Anctil, M. ULTRASTRUCTURAL CORRELATES OF LUMINESCENCE IN /PORICHTHYS/ PHOTOPHORES. I. EFFECTS OF SPINAL CORD STIMULATION AND EXOGENOUS NORADRENALINE. Rev. Can. Biol. 38 (2): 67-80. June 1979. SFA 25(1)
[Dep. Sci. Biol., Univ. Montreal, C.P. 6128, Succ. A, Montreal, PQ H3C 3J7, Canada]

80-000131 Anctil, M. ULTRASTRUCTURAL CORRELATES OF LUMINESCENCE IN /PORICHTHYS/ PHOTOPHORES. II. EFFECTS OF METABOLIC INHIBITORS. Rev. Can. Biol. 38 (2): 81-96. June 1979. SFA 25(1)
[Dep. Sci. Biol., Univ. Montreal, C.P. 6128, Succ. A, Montreal, PG H3C 3J7, Canada]

80-000132 Arillo, A.; Doria, L. L.; Margiocco, C.; Melodia, F.; Mensi, P. EFFECTS OF ABRUPT CHANGE IN WATER QUALITY ON RAINBOW TROUT (/SALMO GAIRDNERI/ RICH.). Mem. Ist. Ital. Idrobiol. Dott. Marco de Marchi 36: 91-108. 1978. In English with Italian summ. SFA 25(1)
[Ist. Zool., Univ. Genova, Italy]

80-000133 Arillo, A.; Margiocco, C.; Melodia, F. THE GILL SIALIC ACID CONTENT AS AN INDEX OF ENVIRONMENTAL STRESS IN RAINBOW TROUT, /SALMO GAIRDNERI/, RICHARDSON. J. Fish Biol. 15 (4): 405-410. Oct. 1979. SFA 25(1)

[Ist. Zool., Univ. Genova, Italy] The gill sialic acid content in Rainbow Trout exposed to several aqueous concentrations of ammonia NH(3) and/or to a higher environmental pH was determined by two different methods. The results showed Warren's method was adequate for the biological material, even without purification of the extracts by Dowex 2x8 resin. A significant increase of the sialic acid concentration occurred in fish exposed to ammonia.

80-000134 Assem, H.; Hanke, W. CONCENTRATIONS OF CARBOHYDRATES DURING OSMOTIC ADJUSTMENT OF THE EURYHALINE TELEOST, /TILAPIA MOSSAMBICA/. Comp. Biochem. Physiol. A Comp. Physiol. 64 (1): 5-16. 1979. SFA 25(1)

[Dep. Zool., Univ. Karlsruhe, D-7500 Karlsruhe, West Germany]

80-000135 Assem, H. VOLUME REGULATION OF MUSCLE CELLS IN THE EURYHALINE TELEOST, /TILAPIA MOSSAMBICA/. Comp. Biochem. Physiol. A Comp. Physiol. 64 (1): 17-23. 1979. SFA 25(1)

[Dep. Zool., Univ. Karlsruhe, D-7500 Karlsruhe, West Germany]

80-000136 Babiker, M. M. RESPIRATORY BEHAVIOUR, OXYGEN CONSUMPTION AND RELATIVE DEPENDENCE ON AERIAL RESPIRATION IN THE AFRICAN LUNGFISH (/PROTOPTERUS ANNECTENS/, OWEN) AND AN AIR-BREATHING TELEOST (/CLARIAS LAZERA/, C.). Hydrobiologia 65 (2): 177-187. 17 Aug. 1979. SFA 25(1)

[Dep. Zool., Univ. Coll. North Wales, Bangor, Gwynedd LL57 2UW, Wales]

80-000137 Barahona-Fernandes, M. H. SOME EFFECTS OF LIGHT INTENSITY AND PHOTOPERIOD ON THE SEA BASS LARVAE (/DICENTRARCHUS LABRAX/ (L.)) REARED AT THE CENTRE OCEANOLOGIQUE DE BRETAGNE. Aquaculture 17 (4): 311-321. Aug. 1979. SFA 25(1)

[Fac. Cienc., Dep. Zool., Lisbon, Portugal] Four experiments were performed to determine the effects of light intensity on the growth and survival of sea bass larvae; two experiments dealt with the photoperiod and two with the combined effects of light intensity and the photoperiod. Recently hatched larvae from the same spawning were used within each experiment. The light intensity experiments show that there is better growth but poorer survival at higher light intensities. The photoperiod experiments show a better growth at 18 h photoperiod and a better survival at 12 h exposure to light. The study of the combined effects of light intensity and photoperiod confirmed the hypothesis that strong light intensities are lethal to newly hatched larvae (with no pigmentation). If the light intensity is lowered during the first week, the best rearing conditions were found to be continuous lighting relative to survival rate, and 14-16 h photoperiod relative to growth.

80-000138 Barannikova, I. A.; Vasil'yeva, Ye. V.; Trenkler, I. V.; Tsepelovan, P. G. THE INTERRENAL GLAND IN THE LIFE CYCLE OF DIADROMOUS STURGEONS (FAMILY ACIPENSERIDAE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 633-647. 1978. SFA 25(1)
[Leningrad Univ., Leningrad, USSR]

80-000139 Barton, M. SERUM OSMOREGULATION IN TWO SPECIES OF ESTUARINE BLENNIOID FISH, /ANOPLARCHUS PURPURESCENS/ AND /PHOLIS ORNATA/. Comp. Biochem. Physiol. A Comp. Physiol. 64 (2): 305-307. 1979. SFA 25(1)
[Div. Sci. Math., Centre Coll. Ky., Danville 40422]

80-000140 Bauermeister, A. E. M.; Pirie, B. J. S.; Sargent, J. R. AN ELECTRON MICROSCOPIC STUDY OF LIPID ABSORPTION IN THE PYLORIC CAECA OF RAINBOW TROUT (/SALMO GAIRDNERII/) FED WAX ESTER-RICH ZOOPLANKTON. Cell Tissue Res. 200 (3): 475-486. 1 Sept. 1979. SFA 25(1)
[J. R. Sargent: Inst. Mar. Biochem., St. Fittick's Rd., Aberdeen AB1 3RA, Scotland]

80-000141 Beck, A. P. HYDROSTATIC PRESSURE EFFECTS ON EARLY DEVELOPMENTAL STAGES OF STRIPED BASS (/MORONE SAXATILIS/). Ph.D. dissertation, N.Y. Univ. 274p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(5):2028. Nov. 1979. SFA 25(1)

80-000142 Belaud, A.; Trotter, Y.; Peyraud, C. CONTINUOUS EVALUATION OF P(A,O(2)) IN FISH: RECORDING AND DATA PROCESSING. J. Exp. Biol. 82: 321-330. Oct. 1979. SFA 25(1)
[Lab. Physiol. Anim., Fac. Sci. Tech., Brest, France]

80-000143 Belbenoit, P. ELECTRIC ORGAN DISCHARGE OF /TORPEDO/ (PISCES); BASIC PATTERN AND ONTOGENETIC CHANGES. J. Physiol. (Paris) 75: 435-441. 1979. SFA 25(1)
[Inst. Biol. Mar., Univ. Bordeaux I, F-33120 Arcachon, France]

80-000144 Bell, C. C. CENTRAL NERVOUS SYSTEM PHYSIOLOGY OF ELECTRORECEPTION, A REVIEW. J. Physiol. (Paris) 75: 361-379. 1979. SFA 25(1)
[Neurol. Sci. Inst., 1120 N.W. 20th Ave., Portland, OR 97209]

80-000145 Benjamin, M. COMPARATIVE ULTRASTRUCTURAL STUDIES ON THE PROLACTIN CELLS IN THE PITUITARY OF NINE-SPINED STICKLEBACKS, /PUNGITIUS PUNGITIUS/ L., WITH AND WITHOUT ADENOHYPOPHYSEAL CYSTS. Zoomorphologie 93 (2): 125-135. 1979. SFA 25(1)
[Dep. Anat., Univ. Coll., Cardiff CF1 1XL, Wales]

80-000146 Benjamin, M.; Williams, J. G. PITUITARY CYSTS IN THE NINE-SPINED STICKLEBACK, /PUNGITIUS PUNGITIUS/ L. II. LIGHT AND ELECTRON MICROSCOPY. Acta Zool. (Stockh.) 60 (4): 241-250. 1979. SFA 25(1)
[Dep. Anat., Univ. Coll., Cardiff CF1 1XL, Wales]

80-000147 Benjamin, M.; Williams, J. G. PITUITARY CYSTS IN THE NINE-SPINED STICKLEBACK, /PUNGITIUS PUNGITIUS/ L. I. SEASONAL CHANGES AND SALINITY TRANSFER EXPERIMENTS. Acta Zool. (Stockh.) 60 (4): 233-240. 1979. SFA 25(1)
[Dep. Anat., Univ. Coll., Cardiff CF1 1XL, Wales]

80-000148 Bhan, S.; Mansuri, A. P. ADAPTATIONS TO OSMOTIC STRESS IN THE MARINE EURYHALINE TELEOST, /PERIOPHTHALMUS DIPES/. III. CHANGES IN TISSUES SUCCINIC DEHYDROGENASE ENZYME LEVELS. J. Anim. Morphol. Physiol. 25 (1/2): 132-138. June-Dec. 1978. SFA 25(1)
[Biosci. Dep., Saurashtra Univ, Rajkot-360005, Gujarat, India]

80-000149 Blake, R. W. THE ENERGETICS OF HOVERING IN THE MADARIN FISH (/SYNCHROPUS PICTURATUS/). J. Exp. Biol. 82: 25-33. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Cambridge, England] The influence of the ground effect on the energetics of hovering in /Synchropus picturatus/ Peters, a negatively buoyant, demersal teleost was studied. Changes in pectoral fin kinematics, the ultimate water velocity in the wake below the fins, the calculated minimum induced thrust and power required to hover are related to the height at which the animal hovers above the substrate. The profile power required to overcome the frictional drag on the fins has been calculated for the case of both a laminar and a turbulent boundary layer over the fins. Reductions in the total power needed to hover (as compared with that required out of ground effect) of 30-60 percent have been calculated /Synchropus/ when hovering at commonly observed heights above the bottom. Results are discussed in relation to the hovering flight of birds, insects and helicopters.

80-000150 Blaxter, J. H. S.; Hoss, D. E. THE EFFECT OF RAPID CHANGES OF HYDROSTATIC PRESSURE ON THE ATLANTIC HERRING /CLUPEA HARENGUS/ L. II. THE RESPONSE OF THE AUDITORY BULLA SYSTEM IN LARVAE AND JUVENILES. J. Exp. Mar. Biol. Ecol. 41 (1): 87-100. Oct. 1979. SFA 25(1)
[Dunstaffnage Mar. Res. Lab., Oban, Argyll, Scotland]

80-000151 Boge, G.; Rigal, A.; Peres, G. A STUDY OF ENERGIZED TRANSPORT MECHANISMS OF GLYCINE ABSORPTION BY THE RAINBOW TROUT (/SALMO GAIRDNERI/ RICHARDSON). Comp. Biochem. Physiol. A Comp. Physiol. 64 (4): 537-541. 1979. SFA 25(1)
[Lab. Mar. Physiol., Inst. Michel Packa, 83500, Tamaris sur Mer, France]

80-000152 Bonin, J. D. TEMPERATURE TOLERANCE OF JUVENILE MUSKELLUNGE REARED UNDER HATCHERY CONDITIONS. N.Y. Fish Game J. 26 (1): 95-97. Jan. 1979. SFA 25(1)
[Ichthyological Assoc., Inc., Middletown, DE 19709]

80-000153 Bose, K. C.; Ahmad, M. F. HISTOPHYSIOLOGICAL STUDIES ON THE FUNCTIONAL RENAL THYROID FOLLICLES IN THE FRESH WATER FISH /MYSTUS VITTATUS/. J. Anim. Physiol. Anim. Nutr. 40 (3): 155-158. June 1978. SFA 25(1)
[Dep. Zool., Ranchi Univ., Ranchi, India]

80-000154 Bretschneider, F.; Kroesbergen, G.; Beijnink, F. B. FUNCTIONING OF CATFISH ELECTRORECEPTORS: RELATION BETWEEN SKIN POTENTIAL AND RECEPTOR ACTIVITY. J. Physiol. (Paris) 75: 343-347. 1979. SFA 25(1)
[Lab. Verjelijkende Fysiol., Rijksuniv. Utrecht, Jan van Galenstraat 40, 3572 LA Utrecht, The Netherlands]

80-000155 Brill, R. W. THE EFFECT OF BODY SIZE ON THE STANDARD METABOLIC RATE OF SKIPJACK TUNA, /KATSUWONUS PELAMIS/. NOAA Fish. Bull. 77 (2): 494-498. Apr. 1979. SFA 25(1)
[Dep. Zool., Univ. British Columbia, 2075 Wesbrook Mall, Vancouver, BC V6T 1W5, Canada]

80-000156 Brill, R. W. THE THERMAL PHYSIOLOGY OF TUNA. Ph.D. dissertation, Univ. Hawaii 230p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(4):1549. Oct. 1979. SFA 25(1)

80-000157 Brulez, W. DIE WIRKUNG VON UMWELTBELASTUNGEN BEI DEM FISCH /IDUS IDUS/ L. (CYPRINIDAE). III. AKTIVITAET UND HITZERESISTENZ DES ENZYMS KATALASE NACH SCHNELLEN AND LANGSAMEN TEMPERATUREAENDERUNGEN. [RESPONSES OF THE FISH /IDUS IDUS/ L. (CYPRINIDAE) TO ENVIRONMENTAL LOAD. III. EFFECTS OF FAST AND SLOW TEMPERATURE-CHANGES ON ACTIVITY AND HEAT-RESISTANCE OF THE ENZYME CATALASE.] Zool. Anz. 203 (1/2): 12-22. 1979. In German with English summ. SFA 25(1)
[Zool. Inst. Univ. Kiel, Kiel, West Germany]

80-000158 Bubien, J. K.; Meade, T. L. RELATIONSHIP OF ENVIRONMENTAL PCO(2) TO SELECTED BLOOD PARAMETERS OF /ONCORHYNCHUS KISUTCH/ (WALBAUM). J. Fish Biol. 15 (3): 343-347. Sept. 1979. SFA 25(1)
[Anim. Sci. Dep., Univ. R.I., Woodward Hall, Kingston 02881] Blood samples from sub-adult coho salmon (/Oncorhynchus kisutch/) were correlated with environmental conditions. Carbon dioxide tensions, pH and bicarbonate levels were determined in the blood for fish acclimated to environmental CO(2) levels of 2.49 and 2.74 mmHg. Fish were removed from the high pCO(2) environment and placed in one with a low pCO(2). Their blood pH and pCO(2) were monitored during the course of acclimation. After 27 days of acclimation to a low pCO(2) environment, a group of fish was sampled and compared to a group of fish acclimated to a high pCO(2) environment. It was found that pCO(2) in the environment affects the rate of diffusion of carbon dioxide from the blood to the water. Under the environmental conditions prescribed in these experiments no significant change in bicarbonate was noticed. It is postulated that a bicarbonate chloride exchange is not a major pathway for the removal of carbon dioxide from the blood of /O. kisutch/.

80-000159 Buckley, L. J. RELATIONSHIPS BETWEEN RNA-DNA RATIO, PREY DENSITY, AND GROWTH RATE IN ATLANTIC COD (/GADUS MORHUA/) LARVAE. J. Fish. Res. Board Can. 36 (12): 1497-1502. Dec. 1979. In English with French summ. SFA 25(1)
[NMFS, South Ferry Rd., Narragansett, RI 02882]

80-000160 Buddington, R. K. DIGESTION OF AN AQUATIC MACROPHYTE BY /TILAPIA ZILLII/ (GERVAIS). J. Fish Biol. 15 (4): 449-455. Oct. 1979. SFA 25(1)
[Dep. Anim. Sci., Univ. Calif., Davis 95616] The digestive efficiency of /Tilapia zillii/ fed /Najas guadalupensis/ was studied in the laboratory. Digestion was dependent on the ability of the fish to triturate the plant tissues. Based on a dietary reference, cellulose, the total digestibility of /Najas/ was 29.3 percent. Digestive efficiency of the fish for non-cellulose organic matter, protein and fat was 55.7 percent, 75.1 percent and 75.9 percent, respectively. Of the total caloric content of the plant, 45.4 percent was assimilated. An estimate was made of the amount of Najas necessary to satisfy the caloric expenditure of the fish.

80-000161 Bullock, T. H. PROCESSING OF AMPULLARY INPUT IN THE BRAIN: COMPARISON OF SENSITIVITY AND EVOKED RESPONSES AMONG ELASMOBRANCH AND SILURIFORM FISHES. J. Physiol. (Paris) 75: 397-407. 1979. SFA 25(1)
[Scripps Inst. Oceanogr., Univ. Calif., La Jolla 92093]

80-000162 Bullock, T. H. WHAT IS THE INTEREST FOR GENERAL NEUROPHYSIOLOGY OF ELECTRORECEPTION IN CERTAIN FISHES? J. Physiol. (Paris) 75: 315-317. 1979. SFA 25(1)
[Scripps Inst. Oceanogr., Univ. Calif., La Jolla 92093]

80-000163 Burggren, W. W. BIOMODAL GAS EXCHANGE DURING VARIATION IN ENVIRONMENTAL OXYGEN AND CARBON DIOXIDE IN THE AIR BREATHING FISH /TRICHOGASTER TRICHOPTERUS/. J. Exp. Biol. 82: 197-213. Oct. 1979. SFA 25(1)
[Zool. Dep., Univ. Mass., Amherst 01003]

80-000164 Butler, P. J.; Taylor, E. W.; Davison, W. THE EFFECT OF LONG TERM, MODERATE HYPOXIA ON ACID-BASE BALANCE, PLASMA CATECHOLAMINES AND POSSIBLE ANAEROBIC END PRODUCTS IN THE UNRESTRAINED DOGFISH /SCYLIORHINUS CANICULA/. J. Comp. Physiol. B Biochem. Syst. Environ. Physiol. 132 (4): 297-303. 1979. SFA 25(1)
[Dep. Zool. Comp. Physiol., Univ. Birmingham, Birmingham B15 2TT, england]

80-000165 Cameron, J. S.; O'Connor, E. F. LIQUID CHROMATOGRAPHIC DEMONSTRATION OF CATECHOLAMINE RELEASE IN FISH HEART. J. Exp. Zool. 209 (3): 473-499. Sept. 1979. SFA 25(1)
[Dep. Med., Albany Med. Coll., Albany, NY 12208]

80-000166 Chekunova, V. I.; Naumov, A. G. ENERGY METABOLISM OF THE HORSEMACKEREL, /TRACHURUS MURPHYI/, AND THE BUTTERFISH, /STROMATEUS MACULATUS/, FROM THE SOUTH-EASTERN PART OF THE PACIFIC OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 468-474. 1978. SFA 25(1)
[VNIRO, Moscow, USSR] Data on the metabolic rate of two pelagic species of fish: the horsemackerel, /Trachurus murphyi/, and the butterfish, /Stromateus maculatus/, were obtained on the basis of respiratory experiments carried out on board the research vessel "Akademik Knipovich" in the south-eastern part of the Pacific Ocean. Equations of the metabolism/body weight relationship are given. The age and mean daily growth were calculated from otoliths and scales. The rations for both species were calculated.

80-000167 Cook, H.; McKeown, B. A.; Duff, D. W.; Flagg, L. N.; Squiers, T. S. STUDIES ON THE BLOOD AND BRANCHIAL MUCOUS CELLS OF FRESHWATER AND MARINE ALEWIVES (/ALOSA PSEUDOHAREGUS/). Comp. Biochem. Physiol. A Comp. Physiol. 64 (2): 245-249. 1979. SFA 25(1)
[Dep. Biol., King's Coll., Edmonton, AB, Canada]

80-000168 Crim, J. W.; Urano, A.; Gorbman, A. IMMUNOCYTOCHEMICAL STUDIES OF LUTEINIZING HORMONE-RELEASING HORMONE IN BRAINS OF AGNATHAN FISHES. II. PATTERNS OF IMMUNOREACTIVITY IN LARVAL AND MATURING WESTERN BROOK LAMPREY (/LAMPETRA RICHARDSONI/). Gen. Comp. Endocrinol. 38 (3): 290-299. July 1979. SFA 25(1)
[Dep. Zool., Univ. Ga., Athens 30602]

80-000169 Czeczuga, B. CAROTENOIDS IN FISH. XX. CAROTENOIDS IN /SALMO GAIRDNERI/ RICH. AND /SALMO TRUTTA/ MORPHA /FARIO/ L. Hydrobiologia 64 (3): 251-259. 22 June 1979. SFA 25(1)
[Dep. Gen. Biol., Med. Acad., 15-230 Bialystok, Poland]

80-000170 Czihak, G.; Peter, R.; Puschendorf, B.; Grunicke, H. SOME DATA ON THE BASIC METABOLISM OF TROUT EGGS. J. Fish Biol. 15 (2): 185-193. Aug. 1979. SFA 25(1)
[Inst. Fischforsch. Thaur Univ. Innsbruck, Austria] Oxygen comsumption was found to be essentially the same in unfertilized trout eggs, water activated eggs and eggs immediately after fertilization. Trout eggs are capable of regulating the pH of the surrounding medium probably by releasing buffering electrolytes. The electrolyte composition of the coelomic fluid is close to normal vertebrate blood serum. The coelomic fluid may permit further growth of ovulated eggs before spawning.

80-000171 Dave, G.; Johansson-Sjobeck, M.-L.; Larsson, A.; Lewander, K.; Lidman, U. EFFECTS OF CORTISOL ON THE FATTY ACID COMPOSITION OF THE TOTAL BLOOD PLASMA LIPIDS IN THE EUROPEAN EEL, /ANGUILLA ANGUILLA/ L. Comp. Biochem. Physiol. A Comp. Physiol. 64 (1): 37-40. 1979. SFA 25(1)
[Dep. Zoophysiol., Univ. Goteborg, Fack, S-400 33 Goteborg, Sweden]

80-000172 de Vlaming, V. L.; Delahunty, G.; Prack, M.; Bauer, G. ESTRADIOL-17 BETA EFFECTS ON SERUM ORGANIC PO(4), CHOLESTEROL AND PROTEIN IN /CARASSIUS AURATUS/. Copeia 1979 (4): 749-751. 28 Nov. 1979. SFA 25(1)
[Dep. Biol., Marquette Univ., Milwaukee, WI 53233]

80-000173 Degnan, K. J.; Zadunaisky, J. A. OPEN-CIRCUIT SODIUM AND CHLORIDE FLUXES ACROSS ISOLATED OPERCULAR EPITHELIA FROM THE TELEOST /FUNDULUS HETEROCLITUS/. J. Physiol. (Lond.) 294: 483-495. Sept. 1979. SFA 25(1)
[Dep. Physiol. Biophys., N.Y. Univ. Med. Cent., 550 First Ave., New York 10016]

80-000174 Desai, A. K. DISTRIBUTION OF CHOLINESTERASE IN THE LIVER & STOMACH OF THE MIGRATORY FISH, /HILSA ILISHA/ & NON-MIGRATORY /HILSA TOLI/. J. Anim. Morphol. Physiol. 25 (1/2): 124-131. June-Dec. 1978. SFA 25(1)
[Dep. Zool., Fac. Sci., M.S. Univ. Baroda, Baroda 390 002, India]

80-000175 Dettlaff, T. A.; Davydova, S. I. DIFFERENTIAL SENSITIVITY OF CELLS OF FOLLICULAR ƵPITHELIUM AND OOCYTES IN THE STELLATE STURGEON TO UNFAVORABLE CONDITIONS, AND CORRELATING INFLUENCE OF TRIIODOTHYRONINE. Gen. Comp. Endocrinol. 39 (2): 236-243. Oct. 1979. SFA 25(1)
[N.K. Koltzov Inst. Dev. Biol., USSR Acad. Sci., Moscow, USSR]

80-000176 Evans, R. M. ONSET AND RATE OF DRINKING IN RAINBOW TROUT (/SALMO GAIRDNERI/) FOLLOWING TRANSFER TO DILUTE SEAWATER. Can. J. Zool. 57 (10): 1863-1865. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Zool., Univ. Manitoba, Winnipeg, MB R3T 2N2, Canada]
Seawater-adapted teleosts drink to offset water loss by osmosis. A direct method of monitoring drinking by implanting a fistula to drain the stomach indicated that rainbow trout began drinking from about 9 to 12 (range 1 to 22) h after being placed in 15°/oo sea water. Unlike the Japanese eel (/Anguilla japonica/), in which the onset of drinking has been shown to be immediate and reflex-like, the onset of drinking in trout appears to occur only after appreciable water has been lost to the medium. The trout resembles the eel in that the capacity to swallow water in the absense of postingestional negative feedback exceeds the rate of drinking required to maintain normal water balance.

80-000177 Ewing, R. D.; Johnson, S. L.; Pribble, H. J.; Lichatowich, J. A. TEMPERATURE AND PHOTOPERIOD EFFECTS ON GILL (NA + K)-ATPASE ACTIVITY IN CHINOOK SALMON (/ONCORHYNCHUS TSHAWYTSCHA/). J. Fish. Res. Board Can. 36 (11): 1347-1353. Nov. 1979. In English with French summ. SFA 25(1)
[Oreg. Dep. Fish Wildl., Res. Div. Sect., Corvallis 97330]

80-000178 Farrell, A. P.; Daxboeck, C.; Randall, D. J. THE EFFECT OF INPUT PRESSURE AND FLOW ON THE PATTERN AND RESISTANCE TO FLOW IN THE ISOLATED PERFUSED GILL OF A TELEOST FISH. J. Comp. Physiol. B Biochem. Syst. Environ. Physiol. 133 (3): 233-240. 1979. SFA 25(1)
[Cardiovascular Res. Lab., U.S.C. Med. Cent., 1200 N. State St., Box 1800, Los Angeles, CA 90033]

80-000179 Fauconneau, B.; Luquet, P. EFFECT OF TEMPERATURE RISE ON BLOOD AMINOACIDS AND AMMONIA IN RAINBOW TROUT (/SALMO GAIRDNERI/ R.) AFTER FEEDING. INFLUENCE D'UNE ELEVATION DE TEMPERATURE SUR L'EVOLUTION DE L'AMINOACIDEMIE ET DE L'AMMONIEMIE APRES LE REPAS CHEZ LA TRUITE ARC EN CIEL (/SALMO GAIRDNERI/ R.). Ann. Biol. Anim. Biochim. Biophys. 19 (4): 1063-1079. 1979. In French with English summ. SFA 25(1)
[Lab. Nutr. Poissons, INRA, Cent. Rech. Hydrobiol., Saint-Pee-sur-Nivelle, 64310 Ascain, France]

80-000180 Fisher, W. K.; Thompson, E. O. P. MYOGLOBIN OF THE SHARK /HETERODONTUS PORTUSJACKSONI/: ISOLATION AND AMINO ACID SEQUENCE. Aust. J. Biol. Sci. 32 (3): 277-294. June 1979. SFA 25(1)
[Sch. Biochem., Univ. New South Wales, P.O. Box 1, Kensington, N.S.W. 2033, Australia]

80-000181 Fletcher, G. L. THE EFFECTS OF HYPOPHYSECTOMY AND PITUITARY REPLACEMENT ON THE PLASMA FREEZING POINT DEPRESSION, CL , GLUCOSE AND PROTEIN ANTI-FREEZE IN THE WINTER FLOUNDER (/PSEUDOPLEURONECTES AMERICANUS/). Comp. Biochem. Physiol. A Comp. Physiol. 63 (4): 535-537. 1979. SFA 25(1)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

80-000182 Fong, W.; O'Dor, R. K. D-MANNITOL INTERFERES WITH AMINO ACID ANALYSIS OF MARINE ORGANISMS. J. Fish. Res. Board Can. 36 (9): 1134-1137. Sept. 1979. In English with French summ. SFA 25(1)
[Inst. Oceanogr., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

80-000183 Fossat, B.; Lahlou, B. THE MECHANISM OF COUPLED TRANSPORT OF SODIUM AND CHLORIDE IN ISOLATED URINARY BLADDER OF THE TROUT. J. Physiol. (Lond.) 294: 211-222. Sept. 1979. SFA 25(1)
[Lab. Physiol. Comp., Fac. Sci. Parc Valrose, 06034 Nice Cedex, France]

80-000184 Freadman, M. A. ROLE PARTITIONING OF SWIMMING MUSCULATURE OF STRIPED BASS, /MORONE SAXATILIS/ WALBAUM AND BLUEFISH, /POMATOMUS SALTATRIX/ L. J. Fish Biol. 15 (4): 417-423. Oct. 1979. SFA 25(1)
[Yale Univ., 290 Congress Ave., New Haven, CT 06519]
Electromyography was used to determine the functional roles of the axial musculature in striped bass and bluefish at imposed swimming velocities. The lateral red muscle powers propulsive movements at all sustainable swimming speeds in both species. The amplitude and frequency of EMG's from the red muscle grade with increasing swimming velocity. The white muscle, forming the main mass of the myotome, is reserved for high-speed burst swimming above maximum sustainable speeds. The proportion of the myotome occupied by the red muscle at the level of the caudal peduncle is 10.9 percent and 18.6 percent for the striped bass and the bluefish respectively.

80-000185 Fryer, J. N. PROLACTIN-BINDING SITES IN TILAPIA (/SAROTHERODON MOSSAMBICUS/) KIDNEY. Gen. Comp. Endocrinol. 39 (3): 397-403. Nov. 1979. SFA 25(1)
[Dep. Anat., Fac. Med., Univ. Ottawa, Ottawa K1N 9A9, Canada]

80-000186 Fryer, J. N. A RADIORECEPTOR ASSAY FOR PURIFIED TELEOST GROWTH HORMONE. Gen. Comp. Endocrinol. 39 (2): 123-130. Oct. 1979. SFA 25(1)
[Dep. Anat., Fac. Med., Univ. Ottawa, Ottawa, ON K1N 9A9, Canada]

80-000187 Fryer, J. N.; Nishioka, R. S.; Bern, H. A. SOMATOSTATIN INHIBITION OF TELEOST GROWTH HORMONE SECRETION. Gen. Comp. Endocrinol. 39 (2): 244-246. Oct. 1979. SFA 25(1)
[Dep. Anat., Sch. Med., Univ. Ottawa, Ottawa, ON K1N 9A9, Canada]

80-000188 Galis, F.; Smit, H. HYPOXIA TOLERANCE OF TWO CLOSELY RELATED /HAPLOCHROMIS/ SPECIES (PISCES: CICHLIDAE): /HAPLOCHROMIS ELEGANS/ TREWAVAS, 1933 AND /H. ANGUSTIFRONS/ BOULENGER, 1914. Comp. Biochem. Physiol. A Comp. Physiol. 64 (1): 137-139. 1979. SFA 25(1)
[Zool. Lab., Univ. Leiden, The Netherlands]

80-000189 Grau, E. G.; Stetson, M. H. GROWTH HORMONE IS THYROTROPIC IN /FUNDULUS HETEROCLITUS/. Gen. Comp. Endocrinol. 39 (1): 1-8. Sept. 1979. SFA 25(1)
[Zool. Dep., Univ. Calif., Berkley 94720] Ovine Growth hormones elevates serum T(4) in both intact and hypophysectomized /Fundulus heteroclitus/. This activity appears to be an intrinsic property of oGH and is not due to contamination by either oTSH or other glycoprotein hormones. Moreover, while hypophysectomy prevents the oTSH-induced increase in serum T(4) found in intact fish, simultaneous treatment with oGH fully restores the normal response. Unlike oTSH, oGH lacks the ability to elevate thyroidal radioiodine uptake in hypophysectomized /Fundulus/. Thus, oGH appears to act at a level beyond the iodine trap stimulating thyroid function.

80-000190 Guppy, M.; Hulbert, W. C.; Hochachka, P. W. METABOLIC SOURCES OF HEAT AND POWER IN TUNA MUSCLES. II. ENZYME AND METABOLINE PROFILES. J. Exp. Biol. 82: 303-320. Oct. 1979. SFA 25(1)
[P. W. Hochachka: Dep. Zool., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

80-000191 Hamoir, G.; Gerardin-Otthiers, N. THE SARCOPLASMIC PROTEINS OF WHITE MUSCLE OF AN ANTARCTIC HEMOGLOBIN-FREE FISH, /CHAMPSOCEPHALUS GUNNARI/. Comp. Biochem. Physiol. B Comp. Biochem. 64 (1): 17-23. 1979. SFA 25(1)
[Lab. Biochim. Musculaire, Inst. Chim., Univ. Liege, Sart Tilman, 4000, Liege, Belgium]

80-000192 Hanham, A.; Smith, M. J. SEQUENCE ORGANIZATION IN THE GENOMIC DNA OF THE CHUM SALMON, /ONCORHYNCHUS KETA/. Can. J. Zool. 57 (10): 1878-1886. Oct. 1979. In English with French summ. SFA 25(1)
[M. J. Smith: Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada]

80-000193 Hanson, R. C.; Fleming, W. R. SERUM CORTISOL LEVELS OF JUVENILE BOWFIN, /AMIA CALVA/: EFFECTS OF HYPOPHYSECTOMY, HORMONE REPLACEMENT AND ENVIRONMENTAL SALINITY. Comp. Biochem. Physiol. A Comp. Physiol. 63 (4): 499-502. 1979. SFA 25(1)
[Dep. Physiol. Biophys., Univ. Tenn. Cent. Health Sci., Memphis 38163]

80-000194 Hart, N.; Pontier, P. ACID PHOSPHATASE IN EGGS OF THE ZEBRAFISH, /BRACHYDANIO RERIO/. Experientia (Basel) 35 (8): 999-1001. 15 Aug. 1979. SFA 25(1)
[Dep. Zool., Rutgers Univ., New Brunswick, NJ 08903]

80-000195 Hartwell, S. I.; Hoss, D. E. THERMAL SHOCK RESISTANCE OF SPOT (/LEIOSTOMUS XANTHURUS/) AFTER ACCLIMATION TO CONSTANT OR CYCLING TEMPERATURE. Trans. Am. Fish. Soc. 108 (4): 397-400. July 1979. SFA 25(1)
[Johns Hopkins Univ., Chesapeake Bay Inst., Baltimore, MD 21218]

80-000196 Haschemeyer, A. E. V.; Persell, R.; Smith, M. A. K. EFFECT OF TEMPERATURE ON PROTEIN SYNTHESIS IN FISH OF THE GALAPAGOS AND PERLAS ISLANDS. Comp. Biochem. Physiol. B Comp. Biochem. 64 (1): 91-95. 1979. SFA 25(1)
[Dep. Biol. Sci., Hunter Coll., New York, NY 10021]

80-000197 Haugede-Carre, F.; Szabo, T.; Kirschbaum, F. DEVELOPMENT OF GIGANTOCEREBELLUM OF THE WEAKLY ELECTRIC FISH /POLLIMYRUS/. J. Physiol. (Paris) 75: 381-395. 1979. SFA 25(1)
[CNRS, Lab. Physiol. Nerv., Dep. Neurophysiol. Sens., F-91190 Gif-sur-Yvette, France]

80-000198 Hayashi, S.; Ooshiro, Z. GLUCONEOGENESIS IN ISOLATED LIVER CELLS OF THE EEL, /ANGUILLA JAPONICA/. J. Comp. Physiol. B Biochem. Syst. Environ. Physiol. 132 (4): 343-350. 1979. SFA 25(1)
[Fac. Fish., Kagoshima Univ., Kagoshima 890, Japan]

80-000199 Hentschel, H.; Muller, M. SIALIC ACIDS IN EPITHELIAL TISSUES OF /CARASSIUS AURATUS GIBELIO/ (BLOCH) (PRUSSIAN CARP), /COTTUS GOBIO/ L. (BULLHEAD) AND /MYOXOCEPHALUS SCORPIUS/ (L.) (BULL ROUT). Comp. Biochem. Physiol. A Comp. Physiol. 64 (4): 585-588. 1979. SFA 25(1)
[Inst. Zool., Tierarztliche Hochschule Hannover, Bischopholer Damm 15, D-3000 Hannover 1, West Germany]

80-000200 Hofer, R. THE ADAPTATION OF DIGESTIVE ENZYMES TO TEMPERATURE, SEASON AND DIET IN ROACH, /RUTILUS RUTILUS/ AND RUDD /SCARDINIUS ERYTHROPHTHALMUS/; PROTEASES. J. Fish Biol. 15 (4): 373-379. Oct. 1979. SFA 25(1)
[Inst. Zoophysiol., Univ. Innsbruck, Austria] The seasonal changes of proteolytic activity in the gut content of roach /R. rutilus/ and rudd /S. erythrophthalmus/ in four Tyrolean lakes and the adaptation of the proteases to constant temperatures and different natural diets were studied. In rudd proteolytic activity remains nearly constant throughout the year. In roach proteolytic activity increases and then decreases during the first three months after the thaw in spring. This period appears to be endogenously controlled and is followed by a second stage in which proteolytic activity is influenced by environmental factors. Under natural conditions both species have a higher proteolytic activity when feeding on animals than on detritus. Under laboratory conditions there is a slight maximum at an environmental temperature of 16°C when the fish had been fed on meal worms. With plant food a significant dependence of proteolytic activity on environmental temperature was only found in roach.

80-000201 Hofmann, E. L.; Butler, D. G. THE EFFECT OF INCREASED METABOLIC RATE ON RENAL FUNCTION IN THE RAINBOW TROUT, /SALMO GAIRDNERI/. J. Exp. Biol. 82: 11-23. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Toronto, Toronto, ON, Canada] A highly significant linear correlation was found between glomerular filtration rate and urine flow rate in both freshwater and seawater Trout. The percentage tubular reabsorption of water was approximately 33 percent greater in seawater trout than in freshwater trout. As oxygen consumption increased, the urine flow rate increased in freshwater and seawater rainbow trout. The proportional increase in urine flow with incremental changes in oxygen consumption was approximately the same in fresh water and sea water. A significant positive linear relationship between oxygen consumption and glomerular filtration rate was found in both salinities. The proportional increase in GFR with incremental changes in the oxygen consumption rate was higher in the seawater trout than in the freshwater trout. As oxygen consumption increased, the percentage tubular reabsorption of water decreased in the freshwater trout. No significant relationship between these two factors was found in the seawater trout.

80-000202 Hokazono, S.; Tanaka, Y.; Katayama, T.; Chichester, C. O.; Simpson, K. L. INTESTINAL TRANSPORT OF L-LYSINE IN RAINBOW TROUT, /SALMO GAIRDNERI/. Bull. Jpn. Soc. Sci. Fish. 45 (7): 845-848. July 1979. SFA 25(1)

80-000203 Holstein, B. GASTRIC ACID SECRETION AND DRINKING IN THE ATLANTIC COD (/GADUS MORHUA/) DURING ACIDIC OR HYPEROSMOTIC PERFUSION OF THE INTESTINE. Acta Physiol. Scand. 106 (3): 257-265. July 1979. SFA 25(1)
[Dep. Zoophysiol., Univ. Goteborg, Sweden]

80-000204 Hooker, W. M.; McMillan, P. J.; Thaete, L. G. ULTIMOBRANCHIAL GLAND OF THE TROUT (/SALMO GAIRDNERI/). II. FINE STRUCTURE. Gen. Comp. Endocrinol. 38 (3): 275-284. July 1979. SFA 25(1)
[Dep. Anat., Loma Linda Univ., Loma Linda, CA 92350]

80-000205 Hopkins, K. D.; Shelton, W. L.; Engle, C. R. ESTROGEN SEX-REVERSAL OF /TILAPIA AUREA/. Aquaculture 18 (3): 263-268. Nov. 1979. SFA 25(1)
[Ala. Coop. Fish. Res. Unit, Auburn Univ., Auburn, AL 36830] Chemical treatments were used to produce sex-reversed female (genetic male) /Tilapia aurea/, which can be bred to produce monosex offspring. Various combinations of estrogens, two synthetic and one natural, an antiandrogen, and a 'pituitary blocking agent' were orally administered to sexually undifferentiated fry. Treatment periods were 4, 5, 6 and 8 weeks. Seven of the 36 treatments produced more than 50 percent females (alpha = 0.05). Two treatments were more successful than the others: (1) 17-alpha-ethynylestradiol (EE) at 100 mg $kg^{-1}$ diet in combination with methallibure (ME) at 100 mg $kg^{-1}$ for 6 weeks and (2) EE-100 with ME-100 and cyproterone acetate (CA) at 100 mg $kg^{-1}$ for 6 weeks. These treatments produced fish that were 90 percent female. Comparisons of the treatments with and without CA indicated that CA may lessen the hormone effectiveness of the treatments. Diethylstilbestrol was as potent as EE in comparable CA treatments.

80-000206 Hori, K.; Fusetani, N.; Hashimoto, K.; Aida, K.; Randall, J. E. OCCURRENCE OF A GRAMMISTIN-LIKE MUCOUS TOXIN IN THE CLINGFISH /DIADEMICHTHYS LINEATUS/. Toxicon 17 (4): 418-424. 1979. SFA 25(1)
[Fac. Fish. Anim. Husb., Hiroshima Univ., Fukuyama, Japan]

80-000207 Hoss, D. E.; Blaxter, J. H. S. THE EFFECT OF RAPID CHANGES OF HYDROSTATIC PRESSURE ON THE ATLANTIC HERRING /CLUPEA HARENGUS/ L. I. LARVAL SURVIVAL AND BEHAVIOUR. J. Exp. Mar. Biol. Ecol. 41 (1): 75-85. 22 Oct. 1979. SFA 25(1)
[NMFS, Beaufort, NC 28516] Larval Atlantic herring (/Clupea harengus/ L.) from 11-39 mm total body length were subjected to different series of pressure changes intended to simulate passage through the cooling water of a thermal power station. This involved both acclimation and rapid pressure increases to 5 atmospheres pressure, followed by rapid decompression. Subsequent mortality, feeding and depth-compensating behaviour were checked as well as the integrity of the gas-filled auditory bulla-swimbladder system which develops between 23-35 mm. There was no evidence of increases in mortality in larvae up to about 20 mm. Larvae from about 25-29 mm showed increased mortality over controls; still larger larvae did not. Larvae which survived the pressure treatment fed as well as controls. There was strong evidence that larvae of all ages attempted to compensate for pressure changes by making appropriate vertical swimming movements. Some of the mortality of the intermediate-sized larvae may be attributed to hyperactivity in a restricted (experimental) space. The bulla membrane in some older larvae was ruptured by the pressure changes. Although this was not immediately a cause of mortality, it would impair mechanical reception in the long term.

80-000208 Hughes, G. M.; Johnston, I. A. HISTOCHEMISTRY OF SOME TROUT RESPIRATORY MUSCLES. Experientia (Basel) 35 (10): 1373-1376. 15 Oct. 1979. SFA 25(1)
[Res. Unit Comp. Anim. Respir., Bristol Univ., Woodland Rd., Bristol BS8 1UG, England]

80-000209 Hulbert, W. C.; Guppy, M.; Murphy, B.; Hochachka, P. W. METABOLIC SOURCES OF HEAT AND POWER IN TUNA MUSCLES. I. MUSCLE FINE STRUCTURE. J. Exp. Biol. 82: 289-301. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

80-000210 Idler, D. R.; Ng, T. B. STUDIES ON TWO TYPES OF GONADOTROPINS FROM BOTH SALMON AND CARP PITUITARIES. Gen. Comp. Endocrinol. 38 (4): 421-440. Aug. 1979. SFA 25(1)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

80-000211 Iijima, N.; Zama, K. [INFLUENCE OF OXIDIZED LIPIDS ON THE LIPID METABOLISM IN THE FISH. II. ABSORPTION AND METABOLISM OF PALMITIC ACID-1-$^{14}$C IN CARP FED WITH OXIDIZED LIPIDS.] Bull. Fac. Fish. Hokkaido Univ. 30 (1): 84-91. Feb. 1979. In Japanese with English summ. SFA 25(1)
[Lab. Food Chem., Fac. Fish., Hokkaido Univ., Hakodate, Japan]

80-000212 Ingoglia, N. A. 4S RNA IS PRESENT IN REGENERATING OPTIC AXONS OF GOLDFISH. Science 206 (4414): 73-75. 5 Oct. 1979. SFA 25(1)
[Dep. Physiol. Neurosci., N.J. Med. Sch., Newark 07103]
Regenerating optic axons of goldfish were loaded with [$^{3}$H]RNA by injecting [$^{3}$H]uridine into the eye and allowing time for the radioactivity to be delivered to the optic tectum. The axons were subsequently removed from the tecta by cutting the optic nerve and allowing the optic axons in the tectum to degenerate. Analysis of tectal [$^{3}$H]RNA by sodium dodecyl sulfate-polyacrylamide gel electrophoresis showed a selective loss of tritiated 4S RNA and not ribosomal RNA from the denervated tecta. These results support the hypothesis that regenerating optic axons of goldfish grow back into the tectum carrying 4S but not ribosomal RNA.

80-000213 Jensen, A. J. ENERGY CONTENT ANALYSIS FROM WEIGHT AND LIVER INDEX MEASUREMENTS OF IMMATURE POLLOCK (/POLLACHIUS VIRENS/). J. Fish. Res. Board Can. 36 (10): 1207-1213. Oct. 1979. In English with French summ. SFA 25(1)
[Dir. Wildl. Freshwater Fish, N-7000 Trondheim, Norway]

80-000214 Jurss, K. EFFECTS OF TEMPERATURE, SALINITY, AND FEEDING ON AMINOTRANSFERASE ACTIVITY IN THE LIVER AND WHITE MUSCLE OF RAINBOW TROUT (/SALMO GAIRDNERI/ RICHARDSON). Comp. Biochem. Physiol. B Comp. Biochem. 64 (2): 213-218. 1979. SFA 25(1)
[Dep. Biol., Subdep. Anim. Physiol., Wilhelm-Pieck-Univ. Rostock, 25 Rostock, West Germany]

80-000215 Kapoor, C. P. EFFECT OF FOLLICLE STIMULATING HORMONE ON FEMALE /PUNTIUS TICTO/ (HAM). J. Anim. Morphol. Physiol. 25 (1/2): 110-118. June-Dec. 1978. SFA 25(1)
[Dep. Zool., Bareilly Coll., Bareilly, U.P., India]

80-000216 Karmanova, I. G.; Lazarev, S. G. NEW DATA ON THE NEUROPHYSIOLOGY OF SLEEP OF FISH AND AMPHIBIANS (THE GENESIS OF THE SLOW-WAVE AND PARADOXICAL PHASES OF SLEEP OF WARM-BLOODED ANIMALS). Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.) 245: 844-847. Sept. 1979. SFA 25(1)
[I. M. Sechenov Inst. Evol. Physiol. Biochem., Acad. Sci. USSR, Leningrad, USSR]

80-000217 Katsuyama, M.; Matsuno, T. ISOLATION AND IDENTIFICATION OF RHODOXANTHIN FROM THE FISH, /TILAPIA NILOTICA/. Bull. Jpn. Soc. Sci. Fish. 45 (8): 1045. Aug. 1979. SFA 25(1)
[Kyoto Coll. Pharm., Yamashina, Kyoto 607, Japan]

80-000218 Kaushik, S. J.; Luquet, P. INFLUENCE OF DIETARY AMINO ACID PATTERNS ON THE FREE AMINO ACID CONTENTS OF BLOOD AND MUSCLE OF RAINBOW TROUT (/SALMO GAIRDNERII/ R.). Comp. Biochem. Physiol. B Comp. Biochem. 64 (2): 175-180. 1979. SFA 25(1)
[Lab. Fish. Nutr., Hydrobiol. Res. Cent., I.N.R.A., Saint Pee-sur-Nivelle, 64310 Ascain, France]

80-000219 Kime, D. E. THE EFFECT OF TEMPERATURE ON THE TESTICULAR STEROIDOGENIC ENZYMES OF THE RAINBOW TROUT, /SALMO GAIRDNERI/. Gen. Comp. Endocrinol. 39 (3): 290-296. Nov. 1979. SFA 25(1)
[Dep. Zool., The University, Sheffield, S10 2TN, England]

80-000220 Kirschbaum, F.; Denizot, J. P.; Tsuji, S. ON THE ELECTROMOTOR NEURONS OF BOTH ELECTRIC ORGANS OF /POLLIMYRUS ISIDORI/ (MORMYRIDAE, TELEOSTEI). J. Physiol. (Paris) 75: 429-433. 1979. SFA 25(1)
[Univ. Koln, Zool. Inst. Lehrstuhl 1, Weyertal 119, 5 Koln, West Germany]

80-000221 Kiyashko, V. I.; Volodin, V. M. THE INFLUENCE ON THE EMBRYONIC DEVELOPMENT OF THE RUFFE, /ACERINA CERNUA/, OF THE ACTIVE RESPONSE OF THE ENVIRONMENT. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 693-695. 1978. SFA 25(1)
[Inst. Biol. Inland Waters, USSR Acad. Sci., Borok, Yaroslavl Reg., USSR]

80-000222 Kobayashi, K.; Nakamura, N. ISOLATION AND IDENTIFICATION OF A CONJUGATED-PCP EXCRETED IN THE URINE OF GOLDFISH. Bull. Jpn. Soc. Sci. Fish. 45 (8): 1001-1003. Aug. 1979. SFA 25(1)
[Lab. Fish. Chem., Fac. Agric., Kyushu Univ., Fukuoka 812, Japan]

80-000223 Konovalov, Yu. D. A STUDY OF THE CONFORMATION OF PROTEINS IN MATURE EGGS, EMBRYOS AND EARLY LARVAE OBTAINED FROM FEMALES OF THE CARP, /CYPRINUS CARPIO/, OF DIFFERENT AGES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 648-655. 1978. SFA 25(1)
[Inst. Hydrobiol., Ukrainian SSR Acad. Sci., Kiev, USSR]

80-000224 Kuz'mina, V. V. MEMBRANE DIGESTION IN CYCLOSTOMES AND FISHES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 599-611. 1978. SFA 25(1)
[Pavlov Inst. Physiol., USSR Acad. Sci., USSR]

80-000225 Lane, H. C. PROGRESSIVE CHANGES IN HAEMATOLOGY AND TISSUE WATER OF SEXUALLY MATURE TROUT, /SALMO GAIRDNERI/ RICHARDSON DURING THE AUTUMN AND WINTER. J. Fish Biol. 15 (4): 425-436. Oct. 1979. SFA 25(1)
[Wake Forest Univ., Winston-Salem, NC]

80-000226 Leatherland, J. F.; Milne, R. S. EFFECT OF PROPRANOLOL AND ISOPROTERENOL ON PLASMA THYROXINE AND TRIIODOTHYRONINE CONCENTRATION IN RAINBOW TROUT (/SALMO GAIRDNERI/). Comp. Biochem. Physiol. C Comp. Pharmacol. 64 (1): 165-168. 1979. SFA 25(1)
[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON, Canada]

80-000227 Lebedeva, N. Ye. THE BIOCHEMICAL COMPOSITION OF THE SKIN AND MUCOSA OF SOME CYPRINIDS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 475-482. 1978. SFA 25(1)
[Dep. Ichthyol., Moscow Univ., USSR]

80-000228 Leger, C.; Gatesoupe, F.-J.; Metailler, R.; Luquet, P.; Fremont, L. EFFECT OF DIETARY FATTY ACIDS DIFFERING BY CHAIN LENGTHS AND OMEGA SERIES ON THE GROWTH AND LIPID COMPOSITION OF TURBOT /SCOPHTHALMUS MAXIMUS/ L. Comp. Biochem. Physiol. B Comp. Biochem. 64 (4): 345-350. 1979. SFA 25(1)
[Inst. Natl. Rech. Agron., Stn. Rech. Nutr., Cent. Natl. Rech. Zootech., 78350 Jouy-en-Josas, France]

80-000229 Leray, C. PATTERNS OF PURINE NUCLEOTIDES IN FISH ERYTHROCYTES. Comp. Biochem. Physiol. B Comp. Biochem. 64 (1): 77-82. 1979. SFA 25(1)
[Lab. Physiol. Comp. Reg., CNRS, B. P. 20 CR, 67037 Strasbourg-Cedex, France]

80-000230 Lewiston, N.; Newman, A.; Robin, E.; Holtzman, D. SHARK HEART MITOCHONDRIA: EFFECTS OF EXTERNAL OSMOLALITY ON RESPIRATION. Science 206 (4414): 75-76. 5 Oct. 1979. SFA 25(1)
[Dep. Pediatrics Neurol. Med., Stanford Univ. Sch. Med., Stanford, CA 94305] Shark mitochondrial respiration was studied in media with osmolalities between 160 and 1500 milliosmoles. The respiratory control ratio, a marker for functional integrity of the isolated mitochondria, was maximal at 1000 milliosmoles and decreased during hypotonic or hypertonic exposure. Shark mitochondria function best at their native tonicity, a value that produces abnormal function in mammalian mitochondria.

80-000231 Loretz, C. A. OSMOTIC AND CELL VOLUME REGULATION IN THE GOBY, /GILLICHTHYS MIRABILIS/. J. Exp. Zool. 210 (2): 237-244. Nov. 1979. SFA 25(1)
[Dep. Zool., Univ. Calif., Berkeley 94720]

80-000232 Maier, W.; Wolburg, H. REGENERATION OF THE GOLDFISH RETINA AFTER EXPOSURE TO DIFFERENT DOSES OF OUABAIN. Cell Tissue Res. 202 (1): 99-118. Oct. 1979. SFA 25(1)
[H. Wolburg: Inst. Pathol., Liebermeesterstr. 8, D-7400 Tubingen, West Germany]

80-000233 Mansuri, A. P.; Bhan, S. ADAPTATIONS TO THE OSMOTIC STRESS IN THE MARINE EURYHALINE TELEOST, /PERIOPHTHALMUS DIPES/. IV. CHANGES IN TOTAL PROTEIN LEVELS OF VARIOUS TISSUES. J. Anim. Morphol. Physiol. 25 (1/2): 139-146. June-Dec. 1978. SFA 25(1)
[Biosci. Dep., Saurashtra Univ., Rajkot-360005, Gujarat, India]

80-000234 Mathur, R. THE EFFECT OF PORCINE CALCITONIN ON PLASMA CALCIUM IN /CHANNA PUNCTATUS/ BLOCH. J. Fish Biol. 15 (3): 329-335. Sept. 1979. SFA 25(1)
[Dep. Zool., Fish Biol. Lab., Univ. Rajasthan, Jaipur-302004, India]
The effect of porcine calcitonin on the plasma calcium of the freshwater Indian murrel, /Channa punctatus/ Bloch has been studied. An injection of 200 MRC mU of porcine calcitonin was given intraperitoneally, while control fish received the gelatin carrier. A significant hypocalcaemia was noted 1 h after calcitonin treatment (P less than 0.001). The plasma calcium had returned to the normal level by the 6th h.

80-000235 Matic-Piantanida, D.; Vidakovic-Bival, V.; Radman, V.; Maretic, Z. ANTISERA AGAINST WEEVER AND SCORPIONFISH VENOMS--A PRELIMINARY REPORT. Toxicon 17 (suppl. 1): 119. 1979. Abstract only. SFA 25(1)
[Inst. Immunol., Zagreb, Yugoslavia]

80-000236 Matsuno, T.; Nagata, S. ON THE CAROTENOIDS OF ARCTIC LAMPREY. Bull. Jpn. Soc. Sci. Fish. 45 (8): 1047. Aug. 1979. SFA 25(1)
[Kyoto Coll. Pharm., Yamashina, Kyoto 607, Japan]

80-000237 McCorkle, F. M.; Chambers, J. E.; Yarbrough, J. D. TOLERANCE OF LOW OXYGEN STRESS IN INSECTICIDE-RESISTANT AND SUSCEPTIBLE POPULATIONS OF MOSQUITOFISH (/GAMBUSIA AFFINIS/). Life Sci. 25 (17): 1513-1518. 22 Oct. 1979. SFA 25(1)
[Dep. Microbiol. Immunol., Univ. Oreg. Health Sci. Cent., Portland]
The tolerance of low oxygen stress in insecticide-resistant and susceptible populations of mosquitofish (/Gambusia affinis/) was investigated. Dissolved oxygen was reduced chemically with formaldehyde and sodium sulfite treatment. Available oxygen was reduced physically through barriers, both by preventing oxygen exchange at the air-water interface and by preventing the fish from contacting the surface of the water. In all cases, the tolerance to low oxygen stress was reduced in the insecticide-resistant population compared to the susceptible population. The results indicate that although tolerance of pesticides in the resistant population has been dramatically increased by environmental selective pressures, tolerance to other stresses has not been concomitantly increased.

80-000238 Mezhnin, F. I. THE INTERRENAL AND SUPRARENAL GLANDS AND STANNIUS' BODIES OF THE GUPPY, /LEBISTES RETICULATUS/, UNDER CONDITIONS OF EXTREME STRESS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 611-632. 1978. SFA 25(1)
[Inst. Biol. Inland Waters, USSR Acad. Sci., Borak Yaroslavl' Province, USSR]

80-000239 Moreau, G.; Barbeau, C. DIFFERENCIATION DE POPULATIONS ANADROMES ET DULCICOLES DE GRANDS COREGONES (/COREGONUS CLUPEAFORMIS/) PAR LA COMPOSITION MINERALE DE LEURS ECAILLES. [DIFFERENTIATION OF ANADROMOUS AND FRESHWATER WHITEFISH (/COREGONUS CLUPEAFORMIS/) BY THE MINERAL COMPOSITION OF THEIR SCALES.] J. Fish. Res. Board Can. 36 (12): 1439-1444. Dec. 1979. In French with English summ. SFA 25(1)
CENTREAU, Univ. Laval, PQ G1K 7P4, Canada]

80-000240 Morii, H. CHANGES WITH TIME OF AMMONIA AND UREA CONCENTRATIONS IN THE BLOOD AND TISSUE OF MUDSKIPPER FISH, /PERIOPHTHALMUS CANTONENSIS/ AND /BOLEOPHTHALMUS PECTINIROSTRIS/ KEPT IN WATER AND ON LAND. Comp. Biochem. Physiol. A Comp. Physiol. 64 (2): 235-243. 1979. SFA 25(1)
[Fac. Fish., Nagasaki Univ., 1-14 Bunkyo-machi, Nagasaki, Japan]

80-000241 Morisawa, M.; Hirano, T.; Suzuki, K. CHANGES IN BLOOD AND SEMINAL PLASMA COMPOSITION OF THE MATURE SALMON (/ONCORHYNCHUS KETA/) DURING ADAPTATION TO FRESHWATER. Comp. Biochem. Physiol. A Comp. Physiol. 64 (3): 325-329. 1979. SFA 25(1)
[Ocean Res. Inst., Univ. Tokyo, Nakano, Tokyo 164, Japan]

80-000242 Mosse, P. R. L. CAPILLARY DISTRIBUTION AND METABOLIC HISTOCHEMISTRY OF THE LATERAL PROPULSIVE MUSCULATURE OF PELAGIC TELEOST FISH. Cell Tissue Res. 203 (1): 141-160. Nov. 1979. SFA 25(1)
[Dep. Zool., Univ. Melbourne, Parkville, Victoria, Victoria 3052, Australia]

80-000243 Mugiya, Y.; Kawamura, H.; Aratsu, S. CARBONIC ANHYDRASE AND OTOLITH FORMATION IN THE RAINBOW TROUT, /SALMO GAIRDNERI/: ENZYME ACTIVITY OF THE SACCULUS AND CALCIUM UPTAKE BY THE OTOLITH /IN VITRO/. Bull. Jpn. Soc. Sci. Fish. 45 (7): 879-882. July 1979. SFA 25(1)
[Fac. Fish., Hokkaido Univ., Hakodate, Hokkaido 041, Japan]

80-000244 Murat, J. C.; Plisetskaya, E. M.; Soltitskaya, L. P. GLUCOSE 6-PHOSPHATASE ACTIVITY IN KIDNEY OF THE RIVER LAMPREY (/LAMPETRA FLUVIATILIS/ L.). Gen. Comp. Endocrinol. 39 (1): 115-117. Sept. 1979. SFA 25(1)
[Univ. Paul Sabatier, Lab. Physiol., 38 Rue des 36 Ponts, 31400 Toulouse, France]

80-000245 Ng, T. B.; Idler, D. R. STUDIES ON TWO TYPES OF GONADOTROPINS FROM BOTH AMERICAN PLAICE AND WINTER FLOUNDER PITUITARIES. Gen. Comp. Endocrinol. 38 (4): 410-420. Aug. 1979. SFA 25(1)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

80-000246 Niederholzer, R.; Hofer, R. THE ADAPTATION OF DIGESTIVE ENZYMES TO TEMPERATURE, SEASON AND DIET IN ROACH /RUTILUS RUTILUS/ L. AND RUDD /SCARDINIUS ERYTHROPHTHALMUS/ L. CELLULASE. J. Fish Biol. 15 (4): 411-416. Oct. 1979. SFA 25(1)
[Inst. Zoophysiol., Univ. Innsbruck, Austria] The cellulolytic activity of the contents of the intestinal tract of populations of roach and rudd in four Tyrolean lakes was studied. Much of the activity was taken up with the diet. In fish feeding on plants and detritus a lower cellulolytic activity was found than in fish feeding on zooplankton or on arthropods. A seasonal pattern of cellulolytic activity was demonstrated with a peak in the autumn. It is assumed that the cellulolytic activity found in the intestinal contents of cyprinids is insufficient for the digestion of fibre, but that it suffices--particularly in omnivorous species--to support the breakdown of cell walls.

80-000247 Nishi, K.; Takano, K. [EFFECTS OF PHOTOPERIOD AND TEMPERATURE ON THE OVARY OF THE BITTERLING, /RHODEUS OCELLATUS OCELLATUS/.] Bull. Fac. Fish. Hokkaido Univ. 30 (1): 63-73. Feb. 1979. In Japanese with English summ. SFA 25(1)
[Lab. Fresh-Water Fish-Cult., Fac. Fish., Hokkaido Univ., Kaokodate, Japan]

80-000248 Obara, S.; Sugawara, Y. CONTRIBUTION OF CA TO THE ELECTRORECEPTOR MECHANISM IN /PLOTOSUS AMPULLAE/. J. Physiol. (Paris) 75: 335-340. 1979. SFA 25(1)
[Dep. Physiol., Teikyo Univ., Sch. Med., 2-11-1, Kaga, Itabashi-Ku, Tokyo 173, Japan]

80-000249 Ogata, H.; Nomura, T.; Hata, M. PROSTAGLANDIN F(2 ALPHA) CHANGES INDUCED BY OVULATORY STIMULI IN THE POND LOACH, /MISGURNUS ANGUILLICAUDATUS/. Bull. Jpn. Soc. Sci. Fish. 45 (7): 929-931. July 1979. SFA 25(1)
[Natl. Res. Inst. Aquacult., Hiruta, Tamaki-cho, Watarai-gun, Mie-ken 519-04, Japan]

80-000250 Ogure, M. A HISTOLOGICAL STUDY ON THE ENDOCRINE AND EXOCRINE GLANDS OF FISH BY BOWIE'S STAIN. Bull. Jpn. Soc. Sci. Fish. 45 (7): 823-827. July 1979. SFA 25(1)
[Fish. Lab., Fac. Agric., Nagoya Univ., Nagoya 464, Chikusaku, Japan]

80-000251 Olcese, J.; de Vlaming, V. /IN VITRO/ ESTRADIOL-17 BETA ACTIONS ON HYPOTHALAMIC MONOAMINE OXIDASE ACTIVITY IN THE GOLDFISH, /CARASSIUS AURATUS/. Gen. Comp. Endocrinol. 39 (1): 110-114. Sept. 1979. SFA 25(1)
[Dep. Biol., Marquette Univ., Milwaukee, WI 53233]

80-000252 Olcese, J. M.; Hall, T. R.; Figueroa, H. R.; de Vlaming, V. L. HYPOTHALAMIC MONOAMINE OXIDASE, A COMPONENT IN THE SEROTONERGIC CONTROL OF PITUITARY PROLACTIN CONTENT IN /CARASSIUS AURATUS/ L. Gen. Comp. Endocrinol. 38 (3): 309-313. July 1979. SFA 25(1)
[V. L. de Vlaming: Dep. Biol., Marquette Univ., Milwaukee, WI 53233]

80-000253 Olivereau, M.; Olivereau, J. ESTRADIOL-POSITIVE FEEDBACK ON GONADOTROPIC (GTH) CELLS IN FRESHWATER MALE SILVER EELS. Gen. Comp. Endocrinol. 39 (3): 247-261. Nov. 1979. SFA 25(1)
[Lab. Physiol., Inst. Oceanogr., 195 rue Saint-Jacques, F 75005 Paris, France]

80-000254 O'Neill, J. G. THE IMMUNE RESPONSE OF THE BROWN TROUT, /SALMO TRUTTA/, L. TO MS2 BACTERIOPHAGE: IMMUNOGEN CONCENTRATION AND ADJUVANTS. J. Fish Biol. 15 (2): 237-248. Aug. 1979. SFA 25(1)
[Dep. Life Sci., Trent Polytech., Burton St., Nottingham NG1 4BU, England] The humoral antibody response to single intraperitoneal inoculations of MS2 bacteriophage was followed in /Salmo trutta/ using a 50 percent bacteriophage neutralisation titre (SD(50)) method. Immune memory was observed with enhancement of both the time and level of antibody production, though an initial suppression was observed 7 days after secondary inoculation. Antibody titres were related to MS2 concentration, and adjuvants were found to enhance the response. An

80-000254 CONTINUED
increased enhancement of antibody production by Freund's complete adjuvant over that of incomplete adjuvant was observed.

80-000255 Onozato, H.; Watabe, N. STUDIES ON FISH SCALE FORMATION AND RESORPTION. III. FINE STRUCTURE AND CALCIFICATION OF THE FIBRILLARY PLATES OF THE SCALES IN /CARASSIUS AURATUS/ (CYPRINIFORMES: CYPRINIDAE). Cell Tissue Res. 201 (3): 409-422. Oct. 1979. SFA 25(1)
[N. Watabe: Electron Microsc. Cent., Univ. S.C., Columbia 29208]

80-000256 Paul, D. H.; Roberts, B. L. THE SIGNIFICANCE OF CEREBELLAR FUNCTION FOR A REFLEX MOVEMENT OF THE DOGFISH. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 134 (1): 69-74. 1979. SFA 25(1)
[Dep. Physiol., Univ. Manchester, Plymouth PL1 2PB, England]

80-000257 Penney, R. K.; Goldspink, G. COMPENSATION LIMITS OF FISH MUSCLE MYOFIBRILLAR ATPASE ENZYME TO ENVIRONMENTAL TEMPERATURE. J. Therm. Biol. 4 (4): 269-272. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Hull, Hull HU6 7RX, England] Goldfish acclimated to a range of temperatures between 5 and 35°C were found to only compensate the specific activity of their myofibrillar ATPase enzyme between 10 and 30°C. The preferred temperatures of goldfish acclimated to 5°C and to 30°C were determined to be about 10 and 26°C respectively. It is concluded that goldfish are only able to acclimate their myofibrillar ATPase system to temperatures between 10 and 30°C, but acclimation to these temperatures enables them to tolerate extremes.

80-000258 Perrier, H.; Perrier, C. SENSIVITY TO HEAT OF THE FIBRINOGEN OF THE RAINBOW TROUT (/SALMO GAIRDNERII/). Comp. Biochem. Physiol. A Comp. Physiol. 63 (4): 481-482. 1979. SFA 25(1)
[Dep. Pharmaceut. Biochem., Univ. Claude Bernard, 8 Rockefeller Ave., 69373 Lyon Cedex 2, France] Rainbow trout Accimated for 3 weeks at 9°C and 21°C during winter have an identical fibrinogen level. Experiments conducted during spring show that fibrinogen is notably lower at 21°C than at 9°C. The critical temperature which causes disappearance of fibrinogen on plasma protein disc electrophoresis pattern after /in vitro/ heating during 10 min., is 54°C for man, 52°C for carp and varies from 45°C (in winter) to 43°C (in spring) for rainbow trout.

80-000259 Pfeffer, E. UEBER DIE VERTEILUNG VON MINERALISCHEN MENGENELEMENTEN IM KOERPER VON FORELLEN UND KARPFEN. [DISTRIBUTION OF MAJOR MINERAL ELEMENTS IN THE BODY OF TROUT AND CARP.] J. Anim. Physiol. Anim. Nutr. 40 (3): 159-164. June 1978. In German with English summ. SFA 25(1)
[Inst. Tierphysiol. Tierernahrung, Univ. Gottingen, West Germany]

80-000260 Phillips, G. R.; Gregory, R. W. ASSIMILATION EFFICIENCY OF DIETARY METHYLMERCURY BY NORTHERN PIKE (/ESOX LUCIUS/). J. Fish. Res. Board Can. 36 (12): 1516-1519. Dec. 1979. In English with French summ. SFA 25(1)
[Coop. Fish. Res. Unit, Dep. Biol., Montana State Univ., Bozeman 59717]

80-000261 Primor, N.; Tu, A. T. CONFORMATION OF THE PARDAXIN, THE PURIFIED POLYPEPTIDE FROM THE TOXIC SECRETION OF THE FLATFISH, /PARDACHIRUS MARMORATUS/, USING THE RAMAN AND C. D. SPECTROMETRY. Toxicon 17 (suppl. 1): 143. 1979. Abstract only. SFA 25(1)
[Dep. Biochem., Colo. State Univ., Fort Collins 80523]

80-000262 Push, S.; Moller, P. SPATIAL ASPECTS OF ELECTROLOCATION IN THE MORMYRID FISH, /GNATHONEMUS PETERSII/. J. Physiol. (Paris) 75: 355-357. 1979. SFA 25(1)
[Dep. Ecol. Evol., State Univ. N.Y., Stoney Brook 11790]

80-000263 Rajagopal, P. K. THE EMBRYONIC DEVELOPMENT AND THE THERMAL EFFECTS ON THE DEVELOPMENT OF THE MOUNTAIN WHITEFISH, /PROSOPIUM WILLIAMSONI/ (GIRARD). J. Fish Biol. 15 (2): 153-158. Aug. 1979. SFA 25(1)
[Utah Coop. Fish. Res. Unit, UMC-52, Utah State Univ., Logan 84322] The general development of the mountain whitefish was similar to other whitefishes. Mountain whitefish required more thermal units to reach corresponding stages of the lake whitefish, after the stage when the blastodisc was prominently raised on the yolk. The development process was greatly disrupted and a heavy mortality of eggs occurred when the temperature was raised to 9° C or higher. In hatched larvae abnormalities like monomicrophthalmia, agape jaws, and coloboma occurred when the temperature was raised to 9° C or higher, although the reported optimum temperature for growth of the post yolk sac larvae and juveniles was 9° C-12° C. The late spawned eggs exhibit adaptive mechanisms which enabled them to shorten the incubation time and hatch along with the early spawned eggs, when conditions for survival are at optimum.

80-000264 Reckhaus, W.; Romer, H.; Rahmann, H. EFFECT OF COOLING ON PHOTIC EVOKED RESPONSES IN THE OPTIC TECTUM OF TELEOSTS. J. Therm. Biol. 4 (3): 209-212. July 1979. SFA 25(1)
[Zool. Inst., Univ. Stuttgart-Hohenheim, 7000 Stuttgart 70, Hohenheim, West Germany]

80-000265 Rombout, J. H. W. M.; Rademakers, L. H. P. M.; van Hees, J. P. PANCREATIC ENDOCRINE CELLS OF /BARBUS CONCHONIUS/ (TELEOSTEI, CYPRINIDAE), AND THEIR RELATION TO THE ENTEROENDOCRINE CELLS. Cell Tissue Res. 203 (1): 9-23. Nov. 1979. SFA 25(1)
[Dep. Exp. Anim. Morphol. Cell Biol., Agric. Univ., Marijkeweg 40, 6709 PG Wageningen, The Netherlands]

80-000266 Rott, N. N.; Bozhkova, V. P.; Kvavilashvili, I Sh.; Khariton, V. Yu.; Sharova, L. V. DEVELOPMENT OF ISOLATED BLASTODERMS OF LOACH DURING CULTIVATION IN DIFFERENT SALINE MEDIA. Sov. J. Dev. Biol. (Engl. Transl. Ontogenez) 9 (5): 394-404. July 1979. SFA 25(1)
[Inst. Dev. Biol., Acad. Sci. USSR, Moscow, USSR]

80-000267 Rovainen, C. M. NEUROBIOLOGY OF LAMPREYS. Physiol. Rev. 59 (4): 1007-1077. Oct. 1979. SFA 25(1)
[Dep. Physiol. Biophys., Washington Univ. Sch. Med., St. Louis, MO]

80-000268 Schlegel, P. SINGLE UNIT ACTIVITY IN THE MESENCEPHALON OF /STERNARCHUS/. J. Physiol. (Paris) 75: 421-428. 1979. SFA 25(1)
[J. W. Goethe Univ., Fachbereich Biol. (Zool.), Siesmayerstr. 70, P 60000 Frankfort, West Germany]

80-000269 Schonborner, A. A.; Boivin, G.; Baud, C. A. THE MINERALIZATION PROCESSES IN TELEOST FISH SCALES. Cell Tissue Res. 202 (2): 203-212. Nov. 1979. SFA 25(1)
[Inst. Morphol., Ecole Med., Geneva, Switzerland]

80-000270 Shaffi, S. A. BIOCHEMICAL COMPARTMENTATION OF FISH TISSUES. II. NONSPECIFIC PHOSPHOMONOESTERASES IN BRAIN. Experientia (Basel) 35 (10): 1280-1282. 15 Oct. 1979. SFA 25(1)
[Reg. Coll. Educ., N.C.E.R.T., Shyamla Hills, Dep. Sci., Bhopal-462013 (M.P.) India]

80-000271 Shears, M. A.; Fletcher, G. L. THE BINDING OF ZINC TO THE SOLUBLE PROTEINS OF INTESTINAL MUCOSA IN WINTER FLOUNDER (/PSEUDOPLEURONECTES AMERICANUS/). Comp. Biochem. Physiol. B Comp. Biochem. 64 (3): 297-299. 1979. SFA 25(1)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

80-000272 Shecherbina, M. A.; Mukoseyeva, Z. A. GLYCONEOGENEIS AS A SOURCE OF ENERGY SUPPLY IN THE CARP, /CYRPINUS CARPIO/, DURING THE PERIOD OF WINTER STARVATION. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 509-513. 1978. SFA 25(1)
[All-Union Pond Fish. Res. Inst, Rybnoye Settlement, Moscow Region, USSR]

80-000273 Short, S.; Taylor, E. W.; Butler, P. J. THE EFFECTIVENESS OF OXYGEN TRANSFER DURING NORMOXIA AND HYPOXIA IN THE DOGFISH (/SCYLIORHINUS CANICULA/ L.) BEFORE AND AFTER CARDIAC VAGOTOMY. J. Comp. Physiol. B Biochem. Syst. Environ. Physiol. 132 (4): 289-295. 1979. SFA 25(1)
[Dep. Zool. Comp. Physiol., Univ. Birmingham, Birmingham B15 2TT, England]

80-000274 Stacey, N. E.; Cook, A. F.; Peter, R. E. SPONTANEOUS AND GONADOTROPIN-INDUCED OVULATION IN THE GOLDFISH, /CARASSIUS AURATUS/ L: EFFECTS OF EXTERNAL FACTORS. J. Fish Biol. 15 (3): 349-361. Sept. 1979. SFA 25(1)

[Zool. Dep., Univ. Alberta, Edmonton, AB, Canada] Spontaneous ovulation in goldfish is synchronized with photoperiod and influenced by water temperature and aquatic vegetation. As the latency to ovulation from injection of HCG is highly temperature dependent, the finding that ovulation occurs at approximately the same time of day at temperatures from 12° to 26°C suggests the time of the endogenous preovulatory gonadotropin surge may change with the temperature. The time of spontaneous ovulation adjusts to a reversed light:dark cycle within 2 weeks; some 4-6 h shifts in a single light:dark cycle modify the time of ovulation. Few sexually mature females kept under long photoperiod (16L:8D) and transferred from cold (13 ± 1°C) to warm (21 ± 1°C) water ovulated spontaneously. Exposure to artificial aquatic vegetation for as little as one light phase significantly increases the proportion of fish ovulating in warm water. Fish kept in cold water without vegetation do not ovulate; the addition of vegetation induces ovulation, although the response latency is longer than in warm water. Aquatic vegetation may be an effective stimulus for ovulation in other teleosts which spawn on this substrate.

80-000275 Stegeman, J. J. TEMPERATURE INFLUENCE ON BASAL ACTIVITY AND INDUCTION OF MIXED FUNCTION OXYGENASE ACTIVITY IN /FUNDULUS HETEROCLITUS/. J. Fish. Res. Board Can. 36 (11): 1400-1405. Nov. 1979. In English with French summ. SFA 25(1)

[Dep. Biol., Woods Hole Oceanogr. Inst., Woods Hole, MA 02543]

80-000276 Storozhuk, A. Ya. AGE-RELATED FEATURES OF THE METABOLISM OF THE COALFISH, /POLLACHIUS VIRENS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 655-665. 1978. SFA 25(1)

[VNIRO, Moscow, USSR] It is shown that features of age-related changes in the relative weight of the liver and in other biological indicators of the coalfish, /Pollachius virens/, are to a considerable extent determined by the specifics of the physiological state during the annual cycle. The sharpest changes in the physiological-biochemical state of fish are observed during the overwintering and spawning periods. Signs of ageing of the organism are noted in specimens aged 11 years and more.

80-000277 Szabo, T.; Enger, P. S.; Libouban, S. ELECTROSENSORY SYSTEMS IN THE MORMYRID FISH, /GNATHONEMUS PETERSII/: SPECIAL EMPHASIS ON THE FAST CONDUCTING PATHWAY. J. Physiol. (Paris) 75: 409-420. 1979. SFA 25(1)

[Lab. Physiol. Nerv., Dep. Neurophysiol. Sens., CNRS, F-91190 Gif-sur-Yvette, France]

80-000278 Takashima, Y.; Takano, K.; Hara, A. [CHANGES IN FEMALE-SPECIFIC SERUM PROTEINS DURING THE COURSE OF INDUCED MATURATION OF FEMALE JAPANESE EELS (/ANGUILLA JAPONICA/).] Bull. Fac. Fish. Hokkaido Univ. 30 (1): 50-61. Feb. 1979. In Japanese with English summ. SFA 25(1)

[Lab. Fresh-Water Fish-Cult., Fac. Fish, Hokkaido Univ., Hakodate, Japan]

80-000279 Takei, Y.; Hirano, T.; Kobayashi, H. ANGIOTENSIN AND WATER INTAKE IN THE JAPANESE EEL, /ANGUILLA JAPONICA/. Gen. Comp. Endocrinol. 38 (4): 466-475. Aug. 1979. SFA 25(1)
[Dep. Physiol., Sch. Med., Kitasato Univ., Asamizodai 1, Sagamihara, Kanagawa, 228 Japan]

80-000280 Temple, N. J.; Martin, P. A.; Connock, M. J. INTESTINAL PEROXISOMES OF GOLDFISH (/CARASSIUS AURATUS/)--EXAMINATION FOR HYDROLASE, DEHYDROGENASE AND CARNITINE ACETYLTRANSFERASE ACTIVITIES. Comp. Biochem. Physiol. B Comp. Biochem. 64 (1): 57-63. 1979. SFA 25(1)
[Dep. Biol. Sci., The Polytechnic, Wolverhampton, WV1 1LY, England]

80-000281 Trust, T. J.; Bull, L. M.; Currie, B. R.; Buckley, J. T. OBLIGATE ANAEROBIC BACTERIA IN THE GASTROINTESTINAL MICROFLORA OF THE GRASS CARP (/CTENOPHARYNGODON IDELLA/), GOLDFISH (/CARASSIUS AURATUS/), AND RAINBOW TROUT (/SALMO GAIRDNERI/). J. Fish. Res. Board Can. 36 (10): 1174-1179. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Biochem., Univ. Victoria, Victoria, BC V8W 2Y2, Canada]

80-000282 Ungell, A.-L.; Nilsson, S. METABOLIC DEGRADATION OF [$^{3}$H]-ADRENALINE IN THE ATLANTIC COD, /GADUS MORHUA/. Comp. Biochem. Physiol. C Comp. Pharmacol. 64 (1): 137-141. 1979. SFA 25(1)
[Dep. Zoophysiol., Univ. Goteborg, Fack, S-400 33 Goteborg, Sweden]

80-000283 Viancour, T. A. PERIPHERAL ELECTROSENSE PHYSIOLOGY: A REVIEW OF RECENT FINDINGS. J. Physiol. (Paris) 75: 321-333. 1979. SFA 25(1)
[Dep. Biol., Rice Univ., Houston, TX 77001]

80-000284 Vigna, S. R.; Gorbman, A. STIMULATION OF INTESTINAL LIPASE SECRETION BY PORCINE CHOLECYSTOKININ IN THE HAGFISH, /EPTATRETUS STOUTI/. Gen. Comp. Endocrinol. 38 (3): 356-359. July 1979. SFA 25(1)
[Dep. Biol., Univ. Oreg., Eugene 97405]

80-000285 Vinnikov, Ya. A.; Pyatkina, G. A.; Shakhmatova, E. I.; Natochin, Yu. V. STRUCTURE AND IONIC COMPOSITION OF OLFACTORY AND RESPIRATORY MUCUS OF STURGEONS AND THE OXIDATIVE HYPOTHESIS OF OLFACTION. Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.) 245: 837-840. Sept. 1979. SFA 25(1)
[I. M. Sechenov Inst. Evol. Physiol. Biochem., Acad. Sci. USSR, Leningrad, USSR]

80-000286 Vriens, A. M. A. J. N.; Bretschneider, F. THE ELECTROSENSITIVITY OF THE LATERAL LINE OF THE EUROPEAN EEL, /ANGUILLA ANGUILLA/ L. J. Physiol. (Paris) 75: 341-342. 1979. SFA 25(1)
[Lab. Vergelijkende Fysiol., Rijksuniv. Utrecht, Jan van Galenstraat 40, 3572 LA Utrecht, The Netherlands]

80-000287 Warner, M. C.; Tomb, A. M.; Diehl, S. A. VARIABILITY AND STABILITY OF SELECTED COMPONENTS IN RAINBOW TROUT /SALMO GAIRDNERI/ SERUM AND THE PRECISION OF AUTOMATED ANALYSIS IN MEARSURING THESE COMPONENTS. J. Fish Biol. 15 (2): 141-151. Aug. 1979. SFA 25(1)
[Alaska Dep. Fish Game, Subport Bldg., Juneau 99801]

80-000288 Wasserman, G. S.; Johnston, R. M. POISONING FROM A LIONFISH STING. Vet. Human Toxicol. 21 (5): 344-345. Oct. 1979. SFA 25(1)
[Children's Mercy Hosp., Univ. Mo., Sch. Med., Kansas City]

80-000289 Winstead, J. T. A SIMPLE METHOD TO OBTAIN SERUM FROM SMALL FISH. NOAA Fish. Bull. 77 (2): 509-511. Apr. 1979. SFA 25(1)
[U.S. EPA, Sabine Island Lab., Gulf Breeze, FL 32561]

80-000290 Wood, M. R.; Cohen, M. J. SYNAPTIC REGENERATION IN IDENTIFIED NEURONS OF THE LAMPREY SPINAL CORD. Science 206 (4416): 344-347. 19 Oct. 1979. SFA 25(1)
[Dep. Biol., Yale Univ., New Haven, CT 06520]

80-000291 Zelson, P. R.; Cagan, R. H. BIOCHEMICAL STUDIES OF TASTE SENSATION--VIII. PARTIAL CHARACTERIZATION OF ALANINE-BINDING TASTE RECEPTOR SITES OF CATFISH /ICTALURUS PUNCTATUS/ USING MERCURIALS, SULFHYDRYL REAGENTS, TRYPSIN AND PHOSPHOLIPASE C. Comp. Biochem. Physiol. B Comp. Biochem. 64 (2): 141-147. 1979. SFA 25(1)
[R. H. Cagan: Monell Chem. Sens. Cent., Univ. Pa., 3500 Market St., Philadelphia 19104] Taste receptors for L-alanine in the channel catfish /Ictalurus punctatus/ have been partially characterized. The binding activity, which is localized to a sedimentable fraction (Fraction P2), was assayed with L-[$^{3}$H]alanine as the ligand. Addition of HgCl(2) or /p/-mercuribenzoate to the assay at 0.1-1mM markedly inhibited binding. The effect was not reversible and was unaffected by increased l-alanine in the binding assay. The sulfhydryl reagents iodoacetate, 5,5'-dithiobis(2-nitrobenzoic acid), arsenite, and N-ethylmaleimide did not show appreciable inhibition of binding. The results suggest that the inhibitory effect of mercurials is not on specific sulfhydryl groups at alanine-binding sites. Treatment of Fraction P2 with phospholipase C decreased binding activity and treatment with trypsin led to increased binding activity.

## GENETICS, VARIATION STUDIES AND HYBRIDIZATION

80-000292 Arai, K.; Onozato, H.; Yamazaki, F. ARTIFICIAL ANDROGENESIS INDUCED WITH GAMMA IRRADIATION IN MASU SALMON, /ONCORHYNCHUS MASOU/. Bull. Fac. Fish. Hokkaido Univ. 30 (3): 181-186. Aug. 1979. SFA 25(1)
[Lab. Embryol. Genet., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

80-000293 Arai, K.; Yamazaki, F. DEVELOPMENTAL CHANGES OF LACTATE DEHYDROGENASE (LDH) ISOZYMES IN THE HYBRID BETWEEN MASU SALMON (/ONCORHYNCHUS MASOU/) AND PINK SALMON (/O. GORBUSCHA/). Bull. Fac. Fish. Hokkaido Univ. 30 (2): 124-128. May 1979. SFA 25(1)
[Lab. Embryol. Genet., Fac. Fish., Hokkaido Univ., Hoakodate, Japan]

80-000294 Ayles, G. B.; Bernard, D.; Hendzel, M. GENETIC DIFFERENCES IN LIPID AND DRY MATTER CONTENT BETWEEN STRAINS OF RAINBOW TROUT (/SALMO GAIRDNERI/) AND THEIR HYBRIDS. Aquaculture 18 (3): 253-262. Nov. 1979. SFA 25(1)
[Fish. Oceans. Can., West. Reg., Freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada] Observed phenotypic differences of lipid content between strains of rainbow trout and their hybrids cultured in small Canadian prairie lakes are related to differences in the size of fish and highly correlated with differences in growth rate. As a percent of dry matter mean lipid levels of different strains and their hybrids ranged from 32.5 percent to 45.9 percent in one experiment and from 11.6 percent to 24.3 percent in another. There were significant additive genetic differences in lipid content between strains, independent of differences in weight, and there also appeared to be significant non-additive x environment interactions. Phenotypic differences in percent dry matter were small compared to the differences in lipid content.

80-000295 Bodaly, R. A. MORPHOLOGICAL AND ECOLOGICAL DIVERGENCE WITHIN THE LAKE WHITEFISH (/COREGONUS CLUPEAFORMIS/) SPECIES COMPLEX IN YUKON TERRITORY. J. Fish. Res. Board Can. 36 (10): 1214-1222. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

80-000296 Danzmann, R. G. THE KARYOLOGY OF EIGHT SPECIES OF FISH BELONGING TO THE FAMILY PERCIDAE. Can. J. Zool. 57 (10): 2055-2060. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Four species of fish from the genus /Etheostoma/, two species from the genus /Percina/, the yellow perch (/Perca flavescens/), and the walleye (/Stizostedion v. vitreum/), from the family Percidae, were examined karyotypically. All species had a diploid number of 48 chromosomes. Similarity in the karyotype of the yellow perch and walleye suggests a monophyletic origin for the subfamilies Percinae and Luciopercinae. Evolution in the family involved pericentric inversions and (or) translocations of chromosomes giving rise to metacentric and submetacentric chromosomes in the genera /Percina/ and /Etheostoma/. /Etheostoma exile/, /E. flabellare/, and /E. caeruleum/ all show a marked reduction in the size of the smallest pair of homologues (group C). The last two pairs of homologues in /E. nigrum/ are of uniform size.

80-000297 Dobrovolov, I. POLYMORPHISM OF MUSCLE PROTEINS OF THE ANCHOVY, /ENGRAULIS ENCRASICHOLUS/, OF THE AZOV-BLACK SEA BASIN AND THE ATLANTIC OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 483-489. 1978. SFA 25(1)
[Fish Resour. Inst., Varna, Bulgaria]

80-000298 Dyatlov, M. A. POPULATION HETEROGENEITY OF THE CISCO, /COREGONUS ALBULA/, OF LAKE LADOGA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 536-544. 1978. SFA 25(1)
[Sev NIORKh, Petrozavadsk, USSR]

80-000299 Edwards, R. J. A REPORT OF GUADALUPE BASS (/MICROPTERUS TRECULI/) X SMALLMOUTH BASS (/M. DOLOMIEUI/) HYBRIDS FROM TWO LOCALITIES IN THE GUADALUPE RIVER, TEXAS. Tex. J. Sci. 31 (3): 231-238. Sept. 1979. SFA 25(1)
[Dep. Zool., Univ. Tex., Austin 78712] Due to a variety of reasons, natural /Micropterus/ interspecific hybrids have rarely been found. Two instances of native /M. treculi/ x exotic /M. dolomieui/ hybridization are reported from the Guadalupe R. system, Comal Co., Texas. Apparently, environmental perturbations in the study localities and the introduction of a non-native species have contributed to the production of these hybrids, creating additional threats to the genetic integrity and continued survival of /M. treculi/, a central Texas endemic.

80-000300 Gall, G. A. E. TWO-STAGE TROUT BROODSTOCK SELECTION PROGRAM: REPRODUCTIVE PERFORMANCE AND GROWTH RATE. Calif. Dep. Fish Game Inland Fish. Admin. Rep. No. 79-2. 24p. Oct. 1977. SFA 25(1)
[Dep. Anim. Sci., Univ. Calif., Davis] The trout broodstocks maintained by the Department are descendants of wild trout trapped and artificially spawned many years ago. These include rainbow, brook, and brown trout used for fishery enhancement and recreation. Although significant gains have been achieved in the past, future improvements under conditions of escalating costs and contracting resources will depend on the development and utilization of efficient mating systems and a scientifically designed selection program. The objective of the program is to supply, through genetic means, quality brood fish that will provide large numbers of high performing fingerlings which will result in improved economics of production of catchable-sized fish. The program is limited to the following four traits plus time of spawning: size of eggs, number of eggs, hatchability, and yearling size of the fish. Selection is performed in two stages. In the first stage, the net merit of individual mating pairs is determined by a selection index of female performance for size and number of eggs and an independent culling level to assess hatchability performance of the pair. In the second stage, mass selection is practiced for yearling weight measured as the weight of individual fish. Reproductive value is evaluated on the basis of both individual performance and the average performance of full-sisters of both the dam and sire. Detailed information regarding data collection procedures, scoring of performance, and marking of fish are included in this report. The FORTRAN computer program is available from the author.

80-000301 Hopkins, K. D. PRODUCTION OF MONOSEX TILAPIA FRY BY BREEDING SEX-REVERSED FISH. Ph.D. dissertation, Auburn Univ. 44p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(5):1971. Nov. 1979. SFA 25(1)

80-000302 Kincaid, H. L. DEVELOPMENT OF STANDARD REFERENCE LINES OF RAINBOW TROUT. Trans. Am. Fish. Soc. 108 (5): 457-461. Sept. 1979. SFA 25(1)
[U.S. FWS, Fish Genet. Lab., P.O. Box 278, Beulah, WY 82712]

80-000303 Klupp, R. GENETIC VARIANCE FOR GROWTH IN RAINBOW TROUT (/SALMO GAIRDNERI/). Aquaculture 18 (2): 123-134. Oct. 1979. SFA 25(1)
[Lehrstuhl Tierzuch. Tech. Univ. Munchen, D-8050 Freising-Werhenstephan, West Germany] The possibilities of genetic improvement of growth of rainbow trout were investigated. Two half-diallel crossing experiments with three strains were performed. In the second experiment families within a strain or strain combinations could be identified. One hundred fish of each strain, strain cross or family were measured at five or four different ages. Differences between strains, crosses and between families within each of them were highly significant at all ages. In juvenile stages heterosis seemed to be present, although it was not statistically significant. Differences between strains became more pronounced as age advanced. Genetic variance within strains and strain crosses was large and appeared to increase with age. Genetic improvement by selection appears promising provided mass selection is not performed too early. The small F-values of preliminary expt. 2 may indicate strong competition within each group which tends to increase residual variability.

80-000304 Laarman, P. W. REPRODUCTION OF F(1) HYBRID SUNFISHES IN SMALL PONDS. Prog. Fish-Cult. 41 (3): 145-147. July 1979. SFA 25(1)
[Mich. Dep. Nat. Resour., Inst. Fish. Res., Ann Arbor 48109]

80-000305 Loudenslager, E. J.; Kitchin, R. M. GENETIC SIMILARITY OF TWO FORMS OF CUTTHROAT TROUT, /SALMO CLARKI/, IN WYOMING. Copeia 1979 (4): 673-678. 28 Nov. 1979. SFA 25(1)
[Dep. Anim. Sci., Univ. Calif., Davis 95616] Patterns of genetic differentiation among populations of cutthroat trout, /Salmo clarki/, in fluvial and lacustrine habitats, as well as in an area where suspected subspecies occur sympatrically were studied using protein electrophoresis. Genetic variability is very low for two genetic parameters; the proportion of loci heterozygous per individual averaged 0.01, and the proportion of loci polymorphic per population averaged 0.05. These low values are attributed to the influence of recent glaciations. The genetic identity of populations is within a narrow spectrum of 1.00 to 0.995. An estimation of the time since divergence between the two morphological forms of cutthroat trout, based on the electrophoretic identity of proteins, is 20,000 years. These results support a hypothesis of a recent origin of the fine-spotted cutthroat trout within the Snake River drainage.

80-000306 May, B.; Stoneking, M.; Wright, J. E., Jr. JOINT SEGREGATION OF MALATE DEHYDROGENASE AND DIAPHORASE LOCI IN BROWN TROUT (/SALMO TRUTTA/). Trans. Am. Fish. Soc. 108 (4): 373-377. July 1979. SFA 25(1)
[Dep. Biol., Pa. State Univ., University Park 16802]

80-000307 May, B.; Wright, J. E.; Stoneking, M. JOINT SEGREGATION OF BIOCHEMICAL LOCI IN SALMONIDAE: RESULTS FROM EXPERIMENTS WITH /SALVELINUS/ AND REVIEW OF THE LITERATURE ON OTHER SPECIES. J. Fish. Res. Board Can. 36 (9): 1114-1128. Sept. 1979. In English with French summ. SFA 25(1)
[Dep. Biol., Pa. State Univ., University Park 16802]

80-000308 McGlade, J.; MacCrimmon, H. TAXONOMIC CONGRUENCE IN THREE POPULATIONS OF QUEBEC BROOK TROUT, /SALVELINUS FONTINALIS/ (MITCHILL). Can. J. Zool. 57 (10): 1998-2009. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

80-000309 Mrakovcic, M.; Haley, L. E. INBREEDING DEPRESSION IN THE ZEBRA FISH /BRACHYDANIO RERIO/ (HAMILTON BUCHANAN). J. Fish Biol. 15 (3): 323-327. Sept. 1979. SFA 25(1)
[Univ. Zagreb, Mikuliceva 32, Yugoslavia] Inbreeding depression was observed in Half and Full sib matings (Inbreeding Coefficient 0.125 and 0.25) of Zebra Danios (/Brachydanio rerio/). Inbreeding at these levels reduced fertility, survival to 30 days, and length at 30 days. There was an increase in the incidence of crippled fry. No effect of inbreeding on either number of eggs per spawn or hatchability were found.

80-000310 Murofushi, M.; Yosida, T. H. CYTOGENETICAL STUDIES ON FISHES, II. KARYOTYPES OF FOUR CARANGID FISHES. Jpn. J. Genet. 54 (5): 367-370. Oct. 1979. SFA 25(1)
[Lab. Biol., Mishima Junior Coll,. Nikon Univ., Mishima 411, Japan]

80-000311 Pontier, P. J.; Hart, N. H. CREATINE KINASE GENE EXPRESSION DURING THE DEVELOPMENT OF /BRACHYDANIO/. J. Exp. Zool. 209 (2): 283-296. Aug. 1979. SFA 25(1)
[Dep. Med., Univ. Tex. Med. Sch., Houston 77025]

80-000312 Russell, H. A.; Jeffrey, J. E. SERUM TRANSFERRIN POLYMORPHISM IN GREY TROUT, /CYNOSCION REGALIS/, FROM THE LOWER RAPPAHANNOCK RIVER. Estuaries 2 (4): 269-270. Dec. 1979. SFA 25(1)
[Dep. Biol., Va. Commonwealth Univ., 901 W. Franklin St., Richmond, VA 23284] Serum transferrin distribution was studied in grey trout, /Cynoscion regalis/, obtained from the lower Rappahannock River of Virginia. Three phenotypes were observed, representing two codominant alleles at a single gene locus. The distribution of the phenotypes, designated as Tf A, Tf B, and Tf AB, did not differ significanly from that predicted by Hardy-Weinberg analysis.

80-000313 Ryabov, I. N. FEATURES OF THE EMBRYONIC AND LARVAL DEVELOPMENT OF THE HYBRID OF THE CARP, /CYRPINUS CARPIO/, AND THE "FIERY /PUNTIUS/", /PUNTIUS CONCHONIUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 577-588. 1978. SFA 25(1)
[Zool. Mus., Moscow Univ., USSR]

80-000314 Tave, D. L. HERITABILITY ESTIMATES FOR LENGTH AND WEIGHT AT 45 AND 90 DAYS IN /TILAPIA NILOTICA/, AND THE CORRELATIONS BETWEEN THESE TRAITS. Ph.D. dissertation, Auburn Univ. 41p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(3):1000. Sept. 1979. SFA 25(1)

80-000315 Thompson, K. W. CYTOTAXONOMY OF 41 SPECIES OF NEOTROPICAL CICHLIDAE. Copeia 1979 (4): 679-691. 28 Nov. 1979. SFA 25(1)
[Cent. Environ. Stud., VPI&SU, Blacksburg, VA 24061]

BEHAVIOR

80-000316 Bachman, R. A.; Reynolds, W. W.; Casterlin, M. E. DIEL LOCOMOTOR ACTIVITY PATTERNS OF WILD BROWN TROUT (/SALMO TRUTTA/ L.) IN AN ELECTRONIC SHUTTLEBOX. Hydrobiologia 66 (1): 45-47. 15 Sept. 1979. SFA 25(1)
[Dep. Biol., Pa. State Univ., University Park 16802] As part of a study to quantify use of space and time by wild brown trout (/Salmo trutta/ L.), we tested 12 trout (in four groups of three; four separate experiments lasting 8 days each; 96 total fish-days of data) in an electronic shuttlebox (ichthyotron) under natural winter temperature and photoperiod conditions, to determine their diel patterns of locomotor activity. Activity was quantified as the number of photocell-monitored light-beam interruptions per hour as fish passed between chambers of the shuttlebox. Data from all four experiments, pooled and expressed as hourly percentages of 24-hour diel activity, yielded a bimodal (crepuscular) pattern, with a major peak at dawn and a lesser one around dusk. The fish were not fed during the experiments, so feeding schedules had no effect on these results. Another experiment with a single fish yielded results similar to the three-fish groups. Other experiments failed to demonstrate a free-running circadian rhythm in this species under constant darkness (DD), and this, along with an apparent lack of anticipation of light change in the activity pattern, suggests that the diel activity pattern observed in this species is exogenously controlled by either absolute light intensity or changing light intensity, or both. Field studies are underway to determine whether diel activity patterns of wild brown trout are the same under natural conditions.

80-000317 Blake, R. W. THE MECHANICS OF LABRIFORM LOCOMOTION. I. LABRIFORM LOCOMOTION IN THE ANGELFISH (/PTEROPHYLLUM EIMEKEI/): AN ANALYSIS OF THE POWER STROKE. J. Exp. Biol. 82: 255-271. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Cambridge, England]

80-000318 Buwalda, R. J. A.; van der Steen, J. THE SENSITIVITY OF THE COD SACCULUS TO DIRECTIONAL AND NON-DIRECTIONAL SOUND STIMULI. Comp. Biochem. Physiol. A Comp. Physiol. 64 (4): 467-471. 1979. SFA 25(1)
[Lab. Comp. Physiol., State Univ. Utrecht, 40 Jan van Galenstraat, Utrecht, The Netherlands] Saccular microphonic responses to underwater sound stimuli were recorded in cod (/Gadus morhua/ L.). Stimuli with p (pressure) to v (velocity) ratios of -50 to +10 dB re far field value were produced by standing wave manipulation. In "high v" conditions a cosine dependence of microphonic levels upon sound direction was found, compatible with a vector detector function for left and right sacculus. "High p" abolished this directional sensitivity. At 122 Hz and p/v ratios of ca - 12 dB, p and v were

80-000318 CONTINUED
equally effective, resulting in a microphonic null response at a phase lead of v by 90°.

80-000319 Casterlin, M. E.; Reynolds, W. W. AGONISTIC DISPLAYS IN THE ROCK BASS, /AMBLOPLITES RUPESTRIS/. Hydrobiologia 65 (1): 19-21. 16 July 1979. SFA 25(1)
[Dep. Biol., Pa. State Univ., Wilkes-Barre 18708] Agonistic encounters between pairs of adult rock bass, /Ambloplites rupestris/ were observed and the behaviour and changes in coloration of the dominant and subordinated individuals analysed. Dominance coloration involved the establishment of a high degree of visual contrast, whereas subordinate coloration made the animals darker and their coloration less striking, thus perhaps serving a protective function.

80-000320 Casterlin, M. E.; Reynolds, W. W. SHARK THERMOREGULATION. Comp. Biochem. Physiol. A Comp. Physiol. 64 (3): 451-453. 1979. SFA 25(1)
[Biol. Dep., Pa. State Univ., POB 1830, Wilkes-Barre 18708] Smooth dogfish sharks, /Mustelus canis/, thermoregulating behaviorally in an electronic shuttlebox preferred a mean temperature of 27.1°C, with a mid-day peak of 28.0°C and crepuscular minima of 25.9°C (dawn) and 26.4°C (dusk). These sharks thermoregulated with the same degree of precision shown by bony fishes. such precise thermoregulation has not previously been reported for any elasmobranch species.

80-000321 Dorn, P.; Johnson, L.; Darby, C. THE SWIMMING PERFORMANCE OF NINE SPECIES OF COMMON CALIFORNIA INSHORE FISHES. Trans. Am. Fish. Soc. 108 (4): 366-372. July 1979. SFA 25(1)
[Res. Dev. Dep., South. Calif. Edison Co., Rosemead, CA 91770]

80-000322 Finger, T. R. PATTERNS OF INTERACTIVE SEGREGATION IN THREE SPECIES OF SCULPINS (/COTTUS/) IN WESTERN OREGON. Ph.D. dissertation, Oreg. State Univ. 135p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(5):2030. Nov. 1979. SFA 25(1)

80-000323 Guennegan, Y.; Rannou, M. SEMI-DIURNAL RHYTHMIC ACTIVITY IN DEEP-SEA BENTHIC FISHES IN THE BAY OF BISCAY. Sarsia 64 (1/2): 113-116. 1979. SFA 25(1)
[Cent. Oceanol. Bretagne, BP 337, 29273 Brest, France] A large baited trap, supporting an Edgerton flash camera system was used several times in the Bay of Biscay between 2000 and 4700 m. Colour photographic sequences (one shot every 3 minutes for about 20 hours) reveal that the presence of fishes around the trap is almost always periodic. This behaviour is synchronous with periodic changes in the direction of weak currents, as indicated by yarns hanging in the trap. Fishes appear outside the trap shortly before low tide on the shore of the Bay. One or two hours before high tide a period of about 6 hours begins with no fish around the trap. They come back a little before the next low tide. This is consistent with various recent records of semi-diurnal tidal currents in the depth of the Bay. It is the only recovered geophysical cycle in the deep-sea and it has clear consequences on the biology of fishes and other benthic animals.

80-000324 Hara, T. J.; Brown, S. B. OLFACTORY BULBAR ELECTRICAL RESPONSES OF RAINBOW TROUT (/SALMO GAIRDNERI/) EXPOSED TO MORPHOLINE DURING SMOLTIFICATION. J. Fish. Res. Board Can. 36 (10): 1186-1190. Oct. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

80-000325 Hosmer, M. J.; Stanley, J. G.; Hatch, R. W. EFFECT OF HATCHERY PROCEDURES ON LATER RETURN OF ATLANTIC SALMON TO RIVERS IN MAINE. Prog. Fish-Cult. 41 (3): 115-119. July 1979. SFA 25(1)
[U.S. FWS, Experimental Hatchery, Kearneysville, WV 25430]

80-000326 Hubert, W. A. SOME PHYSICAL ELEMENTS OF ADULT SMALLMOUTH BASS HABITAT IN A TENNESSEE RIVER MAINSTREAM RESERVOIR AS DETERMINED BY ULTRASONIC TELEMETRY. Ph.D. dissertation, Va. Polytech. Inst. State Univ. 120p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(5): 1978. Nov. 1979. SFA 25(1)
The nature of selected physical elements of adult smallmouth bass habitat in a large mainstream impoundment was evaluated by means of underwater ultrasonic telemetry. Seasonal water temperatures were within the range of tolerance by smallmouth bass, but late summer temperatures exceeded optimum for the species and probably reduced movement. Shallow winter distributions were believed to be a function of cover availability near the water surface, low current velocities, and cloudy skies. Moderate current velocities were associated with smallmouth bass during all seasons of the year. Fluctuations in current velocity and reservoir elevation influenced depth distribution and movement of individual fish. Operation of Wilson and Pickwick Dams for power production, flood control, and navigation and the subsequent effect on current velocity and reservoir elevation influenced the depth distribution and movement of individual smallmouth bass in Pickwick Reservoir. Bottom relief was a major variable governing distribution and movement patterns. Dropoffs between 30° and 45° from the overbank into the original river channel or inundated creek channels were the most common forms of bottom relief utilized by the study fish. Bottom contours influenced the shape of residence areas and movement pathways outside of residence areas. Cover in the form of rocks, stumps, sunken trees, and crevices in hard clay banks was utilized by smallmouth bass. The material from which cover was formed did not appear to be important as long as the cover supplied visual orientation, shelter from current, and darkness. The distribution of cover probably influenced depth distribution, movement along bottom contours, and aggregation of smallmouth bass. Homing abilities of smallmouth bass were observed, particularly homing following voluntary Sojourns.--From abstr.

80-000327 Janzow, F. T. THE SENSORY BASIS OF SOCIAL BEHAVIOR IN THE LARGEMOUTH BASS (/MICROPTERUS SALMOIDES/). Ph.D. dissertation, Okla. State Univ. 132p. 1978. From Diss. Abstr. Int. B Sci. Eng. 40(4): 1579. Oct. 1979. SFA 25(1)
The sensory basis of species recognition and dominance hierarchy establishment in largemouth bass, /Micropterus salmoides/, was studied. Visual, olfactory and lateral line senses were selectively blocked to determine the relative importance of these sensory systems in discrimination between bluegill and bass and in the development of dominance hierarchies. Qualitative descriptions of agonistic motor patterns and color patterns were made. Results suggest a dichotomous sensory basis for species recognition and dominance encounters. Vision and the lateral line appear to be the primary senses involved in discrimination between conspecifics and heterospecifics. Vision and olfaction are necessary for the development of stable dominance

80-000327 CONTINUED
relationships. Motor patterns of bass are similar to those of other centrarchids. Bass also perform spitting, shambiting, and quivering in agonistic contexts.

80-000328 Kanamoto, Z. [ON THE ECOLOGY OF HEXAGRAMMID FISH. IV. MODE OF THE DISTRIBUTION OF /AGRAMMUS AGRAMMUS/ (TEMMINCK ET SCHLEGEL) AND /HEXAGRAMMOS OTAKII/ JORDAN ET STARKS AND COMPOSITION, ABUNDANCE AND FOOD ITEMS OF REEF FISH AROUND THE SEVERAL REEFS.] Jpn. J. Ecol. 29 (2): 171-183. June 1979. In Japanese with English summ. SFA 25(1)
[Dep. Fish. Biol., Fac. Agric., Tohoku Univ., Sendai, 980, Japan]

80-000329 Karplus, I.; Tsurnamal, M.; Szlep, R.; Algom, D. FILM ANALYSIS OF THE TACTILE COMMUNICATION BETWEEN /CRYPTOCENTRUS STEINITZI/ (PISCES, GOBIIDAE) AND /ALPHEUS PURPURILENTICULARIS/ (CRUSTACEA, ALPHEIDAE). J. Comp. Ethol. 49 (4): 337-351. Apr. 1979. In English with German summ. SFA 25(1)
[Heinz Steinitz Mar. Biol. Lab., Hebrew Univ. Jerusalem, Elat, Israel] The tactile communication between the symbiotic goby /Cryptocentrus steinitzi/ and its burrowing shrimp partner /Alpheus purpurilenticularis/ was investigated by film analysis. Warning signals of the goby which elicit the retreat of the shrimp into its burrow consist mainly of rapid fin flicks transmitted to the shrimp through its long antennae. Five different parameters of the structure of the warning signal were analyzed. The effect of various variables on the response of the shrimp and its latency were examined with a stepwise multiple regression analysis. Feedback mechanisms involved in this communication system are described. The evolution of the tail flick warning signal and a model describing the relationship between the main elements involved in the generation of warning signals are discussed.

80-000330 Kratt, L. F.; Smith, R. J. F. AGONISTIC BEHAVIOUR OF AGE 0, AGE 1 AND NON-BREEDING ADULT ARCTIC GRAYLING /THYMALLUS ARCTICUS/ (PALLAS). J. Fish Biol. 15 (4): 389-404. Oct. 1979. SFA 25(1)
[Beak Consultants Ltd., 3530 11A Street N.E., Calgary, AB T2E 6M7, Canada] Age 0 Arctic grayling begin to show agonistic behaviour 3 weeks after emergence and are territorial by their fourth week. Age 1 fish are territorial throughout the summer feeding period. In adults, territoriality is restricted to larger males during the early spring breeding season while after the breeding season both smaller adult males and adult females also hold territories. In sub-adults, larger fish and resident fish tend to win most fights. In adults, males usually win against females. In Fights between adults of the same sex, larger and resident fish usually win. The lateral display becomes more important in the agonistic repertoire of Arctic grayling as they mature and the characteristic large dorsal fin develops. Arctic grayling appear to lack an appeasement display.

80-000331 Miller, R. J.; Janzow, F. T. AN EXPERIMENT ON VISUAL DISCRIMINATION IN THE LARGEMOUTH BASS, /MICROPTERUS SALMOIDES/. Proc. Okla. Acad. Sci. 59: 34-40. 1979. SFA 25(1)
[Dep. Gen. Evol. Biol., Okla. State Univ., Stillwater 74074] Eighteen largemouth bass were run through a training procedure designed to determine whether they could use visual cues (hue, opacity, fluorescence) associated with different monofilament fishing lines in solving a discrimination problem leading to a food reward (an earthworm). Each fish was fed a worm attached to one ("reward line") of two different-colored monofilament lines presented six times per day for several days, then was given an additional worm for taking a

80-000331 CONTINUED
very small piece attched to the reward line. When the feeding response to a tiny attached piece of worm was swift and unhesitating, the first test phase began: the fish was required to bite the empty snap-swivel on the reward line before it was given an allochthonous worm. When the fish bit the reward line in 5 of 6 trials (criterion) it was tested with single-strand monofilament lines (versus 3-strand braided in the first test phase) until it either reached criterion or clearly demonstrated an inability to selectively respond to the reward line. At least one fish was able to discriminate between each line combination tested (3-strand) and the majority of the fish tested were able to reach criterion in the one-strand test as well. Some line combinations proved to be more easily discriminable than others.

80-000332 Mizuno, N.; Uehara, S.; Maki, M. [STUDIES ON A FRESHWATER FISH, /RHINOBIUS BRUNNEUS/ (GOBIIDAE). IV. HABITAT SEGREGATION AMONG SYMPATRIC POPULATIONS OF 4 COLOUR TYPES.] Jpn. J. Ecol. 29 (2): 137-147. June 1979. In Japanese with English summ. SFA 25(1)
[Biol. Inst., Fac. Sci., Ehime Univ., Matsuyama, 790, Japan]

80-000333 Neproshin, A. Yu. BEHAVIOR OF THE PACIFIC MACKEREL, /PNEUMATOPHORUS JAPONICUS/, /WHEN AFFECTED BY VESSEL NOISE. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 695-699. 1978. SFA 25(1)
[TINRO, Vladivostok, USSR]

80-000334 Niwa, H. SCOTOPIC ERG AND PHOTOPIC S-POTENTIAL IN FISH--COMPARISON WITH BEHAVIOURAL DATA. Comp. Biochem. Physiol. A Comp. Physiol. 64 (4): 581-584. 1979. SFA 25(1)
[Fish. Lab., Fac. Agric., Nagaya Univ., Nagaya, Japan]

80-000335 Pals, N.; Schoenhage, A. A. C. MARINE ELECTRIC FIELDS AND FISH ORIENTATION. J. Physiol. (Paris) 75: 349-353. 1979. SFA 25(1)
[Lab. Vergelijkende Fysiol., Rijksuniv. Utrecht, Jan van Galenstraat 40, 3572 LA Utrecht, The Netherlands]

80-000336 Peeke, H. V. S.; Figler, M. H.; Blankenship, N. RETENTION AND RECOVERY OF HABITUATED TERRITORIAL AGGRESSIVE BEHAVIOR IN THE THREE-SPINED STICKLEBACK (/GASTEROSTEUS ACULEATUS/ L.): THE ROLES OF TIME AND NEST RECONSTRUCTION. Behaviour 69 (3/4): 171-182. 1979. In English with German summ. SFA 25(1)
[Lab. Psychobiol., Dep. Psychiatry, Univ. Calif., San Francisco]

80-000337 Peterson, R. H.; Sutterlin, A. M.; Metcalfe, J. L. TEMPERATURE PREFERENCE OF SEVERAL SPECIES OF /SALMO/ AND /SALVELINUS/ AND SOME OF THEIR HYBRIDS. J. Fish. Res. Board Can. 36 (9): 1137-1140. Sept. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

80-000338 Powles, P. M. FISH OF THE KAWARTHAS, PART II. "COOL-WATER" SPECIES. Trent Univ. Biol. Dep. Ecol. Bull. 3 (2): 3-7. 1977. SFA 25(1)
[Biol. Dep., Trent Univ. Peterborough, ON K9J 7B8, Canada]

80-000339 Reynolds, W. W.; Casterlin, M. E. EFFECT OF TEMPERATURE ON LOCOMOTOR ACTIVITY IN THE GOLDFISH (/CARASSIUS AURATUS/) AND THE BLUEGILL (/LEPOMIS MACROCHIRUS/): PRESENCE OF AN 'ACTIVITY WELL' IN THE REGION OF THE FINAL PREFERENDUM. Hydrobiologia 65 (1): 3-5. 16 July 1979. SFA 25(1)
[Dep. Biol., Pa. State Univ., Wilkes-Barre 18708] Goldfish (/Carassius auratus/) and bluegill sunfish (/Lepomis macrochirus/) were placed in aquaria where their locomotor activity was monitored by photocells, and tested at various acclimation temperatures over a range encompassing their final thermal preferenda. Activity was pooled over 24-hour periods to eliminate any circadian rhythm effects. Both species exhibited an 'activity well' of reduced locomotor activity in the region of the final preferendum. Goldfish, tested either singly or in groups of 2-5 individuals, exhibited a social-interaction effect which became more pronounced at higher temperatures. These results are discussed in relation to a thermokinetic interpretation of thermoregulatory behavior in fishes, and to the correspondence between thermal preferenda and thermal optima.

80-000340 Reynolds, W. W.; Casterlin, M. E. THERMOREGULATORY RHYTHM IN JUVENILE MUSKELLUNGE (/ESOX MASQUINONGY/): EVIDENCE OF A DIEL SHIFT IN THE LOWER SET-POINT. Comp. Biochem. Physiol. A Comp. Physiol. 63 (4): 523-525. 1979. SFA 25(1)
[Dep. Biol., Pa. State Univ., Wilkes-Barre 18708] Twelve juvenile muskellunge (/Esox masquinongy/) tested individually in electronic shuttleboxes exhibited a diel rhythm of preferred temperature, with a low of 21.9°C at dawn and a maximum of 27.3°C in late afternoon. The diel pattern of locomotor activity exhibited maxima early and late in the day, when preferred temperatures were beginning to increase and to decrease, respectively; 94 percent of the 24-hr total activity occurred during the day. Comparison of nocturnal and diurnal preferred-temperature frequency distributions suggests that at night the lower thermoregulatory set-point decreases, while the upper set-point does not change; the lower set-point is higher during the day.

80-000341 Richkus, W. A.; Winn, H. E. ACTIVITY CYCLES OF ADULT AND JUVENILE ALEWIVES, /ALOSA PSEUDOHARENGUS/, RECORDED BY TWO METHODS. Trans. Am. Fish. Soc. 108 (4): 358-365. July 1979. SFA 25(1)
[Environ. Cent. Martin Marietta Corp., 1450 S. Rolling Rd., Baltimore, MD 21227]

80-000342 Robertson, D. R.; Sheldon, J. M. COMPETITIVE INTERACTIONS AND THE AVAILABILITY OF SLEEPING SITES FOR A DIURNAL CORAL REEF FISH. J. Exp. Mar. Biol. Ecol. 40 (3): 285-298. 8 Oct. 1979. SFA 25(1)
[Smithsonian Trop. Res. Inst., Box 2072, Balboa, Panama Canal Zone]

80-000343 Roed, K. H. THE TEMPERATURE PREFERENCE OF THE THREE-SPINED STICKLEBACK, /GASTEROSTEUS ACULEATUS/ L. (PISCES), COLLECTED AT DIFFERENT SEASONS. Sarsia 64 (3): 137-141. 1979. SFA 25(1)
[Inst. Mar. Biol. Limnol., Univ. Oslo, P.B. 1064 Blindern, Oslo 3, Norway] Thermal preferences were determined, at different seasons, in an aquarium with stable vertical gradients. The temperature preference was found similar for fish collected in April, June, August, and October, despite different acclimation temperatures and length of acclimation period. Both 0-group and 1-group or older fish chose temperatures less than 11°C, and in most cases preferred temperatures between 4 and 8°C, which was lower than the /in situ/ temperatures most of the year. The results suggest that the temperature preference of stickleback from Oslofjorden may be genetically determined.

80-000344 Sawa, M. AN INSTRUMENT FOR THE AUTOMATIC DETERMINATION OF AUDITORY THRESHOLDS IN SINGLE NEURONS. Bull. Fac. Fish. Hokkaido Univ. 30 (1): 14-22. Feb. 1979. SFA 25(1)
[Lab. Physiol. Ecol., Fac. Fish., Hokkaido Univ., Hakodate, Japan]

80-000345 Serebrov, L. I. THE DISTRIBUTION OF THE YOUNG OF THE MINNOW, /PHOXINUS PHOXINUS/, IN MOVING AND STATIONARY SCHOOLS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 517-520. 1978. SFA 25(1)
[PINRO, Murmansk, USSR]

80-000346 Sil'va, A.; Saburenkov, Ye. N. A STUDY OF THE ROLE OF IMITATION IN THE "VERKHOVKA", /LEUCASPIUS DELINEATUS/, IN RELATION TO SCHOOLING. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 513-517. 1978. SFA 25(1)
[Inst. Oceanol., Cuban Acad. Sci., Havana, Cuba]

80-000347 Smart, H. J.; Gee, J. H. COEXISTENCE AND RESOURCE PARTITIONING IN TWO SPECIES OF DARTERS (PERCIDAE), /ETHEOSTOMA NIGRUM/ AND /PERCINA MACULATA/. Can. J. Zool. 57 (10): 2061-2071. Oct. 1979. In English with French summ. SFA 25(1)
[Redpath Mus., McGill Univ., 859 Sherbrooke St. West, Montreal, PQ H3A 2K6, Canada] This study investigated partitioning of resources along the dimensions of space, food, and time by johnny darters (/Etheostoma nigrum/) and blackside darters (/Percina maculata/). Although both species were abundant in the midcourse of the Whitemouth River and occurred together in all habitats, space was partitioned on a vertical basis. Johnny darters were exclusively benthic whereas blackside darters were much less restricted to the bottom. The latter retained a well developed swim bladder permitting use of the vertical component of the environment. Partitioning of food resources occurred and although similar taxa were consumed by both species (aquatic insects and Crustacea) the proportions were not similar. Johnny darters fed mainly on benthic items whereas blackside darters ate pelagic items. Differences in protrusibility of premaxilla, position of the mouth and eyes, retinal acuity, and number and morphology of gill rakers reflected different modes of life. There was no evidence of partitioning by time.

80-000348 Sutterlin, A. M.; Jokola, K. J.; Holte, B. SWIMMING BEHAVIOR OF SALMONID FISH IN OCEAN PENS. J. Fish. Res. Board Can. 36 (8): 948-954. Aug. 1979. In English with French summ. SFA 25(1)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

80-000349 Tzvetkov, V. I. [THE INFLUENCE OF CHANGES IN BUOYANCY OF PHYSOCLISTIC FISHES ON THE EFFICIENCY OF THEIR DEFENSE-FOOD RELATIONS] Zool. Zh. 58 (6): 871-879. June 1979. In Russian with English summ. SFA 25(1)
[Inst. Anim. Evol. Morphol. Ecol., USSR Acad. Sci., Moscow, USSR] While modelling the changes in buoyancy of physoclistic fishes, we established for 3 marine and 2 fresh-water species the maximum degree of changes regulated by the fishes by means of compensatory swimming, the upper limit of "safe zone". Under the experimental conditions the efficiency of food reactions in two of these species, /Chemichromys/ and /Gasterosteus aculeatus/, suffered no changes upon any controlled changes of buoyancy. Even a small excessive buoyancy increases the availability of prey (stickleback and guppy fry) for predators. The change of methods of defense adds to the decrease of availability but upon the greater excessive buoyancy the balance between the defensive and hydrostatic motivations shifts towards the motor hydrostatic reactions thus demasking the prey and making it still more available for predators.

80-000350 Werner, R. G. HOMING MECHANISM OF SPAWNING WHITE SUCKERS IN WOLF LAKE, NEW YORK. N.Y. Fish Game J. 26 (1): 48-58. Jan. 1979. SFA 25(1)
[Coll. Environ. Sci. For. State Univ. N.Y., Syracuse] The sensory basis for homing in wnite suckers was examined by conducting displacement experiments in Wolf Lake (N.Y.) during the 1975 spawning run. Fish were blinded, olfactorily occluded, or released in presumably unfamiliar parts of the lake with the result that only the olfactorily occluded fish had their homing ability impaired. Analysis of the locations where test fish were recaptured suggests that olfaction may play an important role in the entry of white suckers into the spawning stream.

## LIFE HISTORIES-GENERAL WORKS

80-000351 Aldonov, V. K.; Druzhinin, A. D. SOME DATA ON SCAVENGERS (FAMILY LETHRINIDAE) FROM THE GULF OF ADEN REGION. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 527-535. 1978. SFA 25(1)
[VNIRO, Moscow, USSR]

80-000352 Barbour, S. E.; Rombough, P. J.; Kerekes, J. J. A LIFE HISTORY AND ECOLOGIC STUDY OF AN ISOLATED POPULATION OF "DWARF" OUANANICHE, /SALMO SALAR/, FROM GROS MORNE NATIONAL PARK, NEWFOUNDLAND. Nat. Can. (Que.) 106 (2): 305-311. Mar.-Apr. 1979. In English with French summ. SFA 25(1)
[Biol. Dep., Dalhousie Univ., Halifax, NS B3H 4J1, Canada] Ouananiche, /Salmo salar/, occur in Gros Morne National Park on the Great Northern Peninsula of Newfoundland. They are characterized by slow growth, small size (maximum fork length = 25 cm), low fecundity (maximum 268 ova/fish, 1,500 ova/kg), a high incidence of kelt survival (56 percent of maturing female fish), and a retention of juvenile characteristics. The fish appear to be opportunistic feeders

80-000352 CONTINUED
with aquatic insects and zooplankton the major food items. The population is taxonomically indistinct from anadromous Atlantic salmon and other populations of ouananiche. Small size and repeat spawning are adaptations to a rigorous environment.

80-000353 Bednarz, J. C. ECOLOGY AND STATUS OF THE PECOS GAMBUSIA, /GAMBUSIA NOBILIS/ (POECILIIDAE), IN NEW MEXICO. Southwest. Nat. 24 (2): 311-322. 31 July 1979. SFA 25(1)
[Dep. Anim. Ecol., 124 Science II, Iowa State Univ., Ames 50011] The endangered Pecos gambusia (/Gambusia nobilis/) formerly occurred throughout the lower Pecos River drainage. In New Mexico it is presently limited to seven isolated locations at Bitter Lake National Refuge (Chaves County) and one population at Blue Spring (Eddy County). An estimate of these populations is approximately 933,500 fish. Natural cover used by the Pecos gambusia consisted of aquatic vegetation and submerged cliffs. A transplanting operation in 1973 to establish additional /G. nobilis/ populations at the refuge was successful in two of 19 attempts. Reasons for stocking failures were unknown, but water quality may have been a factor as no /G. nobilis/ were found in habitats where hardness exceeded 5,100 mg/l or conductivity greater than 28,000 micromhos. Also, the presence of green sunfish (/Lepomis cyanellus/) and the lack of aquatic vegetation were probably factors in one case. An estimated 900,000 /G. nobilis/ and over 2,000,000 /G. affinis/ were found sympatrically throughout Blue Spring. The proportion of /g. nobilis/ collected was greatest in spring flows or seepages. Pecos gambusia were found to feed on dipterans and other surface or subsurface insects of suitable size. Dissection of 20 gravid /G. nobilis/ revealed a mean of 38 plus or minus 7.6 (SD) embryos, which was significantly (P less than 0.025) less than /G. affinis/, with a mean of 56 embryos. The smallest male /G. nobilis/ found with a mature gonopodium was 22 mm, standard length.

80-000354 Burr, B. M.; Page, L. M. THE LIFE HISTORY OF THE CYPRESS DARTER, /ETHEOSTOMA PROELIARE/, IN MAX CREEK, ILLINOIS. Ill. Nat. Hist. Surv. Biol. Notes No. 106. 15p. July 1978. SFA 25(1)
[Ill. Nat. Hist. Surv., Urbana]

80-000355 De Silva, S. S.; Silva, E. I. L. BIOLOGY OF YOUNG GREY MULLET, /MUGIL CEPHALUS/ L., POPULATIONS IN A COASTAL LAGOON IN SRI LANKA. J. Fish Biol. 15 (1): 9-20. July 1979. SFA 25(1)
[Dep. Zool., Ruhuna Univ. Coll., Meddawatti, Matara, Sri Lanka] The biology of young grey mullet, /Mugil cephalus/ L. populations of a coastal lagoon--the Negombo Lagoon on the West Coast of Sri Lanka was studied from October 1976 to March 1978. The relative abundance of fry were found to vary from month to month, with peaks occurring in December-January, May and September-October, coinciding with the end of rainy seasons. It was found that the young fry tended to migrate into the lagoon at a size of about 10-20 mm, most frequently between 15-20 mm in length, by which time they were fully scaled. The young fry after a period of growth in the shallow areas of the lagoon, when they reached a size of 30-35 mm, emigrated into the deeper waters of the lagoon. The rate of growth, as computed from length frequency distribution studies, was found to be around 0.24 mm $day^{-1}$. Results of diurnal surveys showed a movement of the larger size fry into shallower waters during the hours of darkness and this movement appears to be independent of the tidal cycle. It is postulated that the cause of this migration is to escape from predators, chiefly piscine. Investigations of the meristic characters indicated that the young fry which migrated into the lagoon at different times of the

80-000355 CONTINUED
year probably originated from a single spawning stock.

80-000356 Dombeck, M. P. MOVEMENT AND BEHAVIOR OF THE MUSKELLUNGE DETERMINED BY RADIO-TELEMETRY. Wis. Dep. Nat. Resour. Tech. Bull. No. 113. 19p. 1979. SFA 25(1)
[Wis. Dep. Nat. Resour., Madison] External radio-transmitters were placed on 18 muskellunge in Moose Lake and Black Lake, Sawyer County, Wisconsin. Movements of the transmitter-tagged muskellunge were monitored for 14 months, during both the open water season and through the ice. Black Lake is predominantly a muskellunge, largemouth bass, panfish lake with an area of 52 ha, while Moose Lake is predominantly a muskellunge and walleye lake with an area of 676 ha. Peak movements and activities occurred in spring and fall when water temperatures were 4-12°C. During the summer months tagged fish occupied waters less than 2 m in depth at temperatures of 24-27°C. Greatest average swimming velocity of muskellunge observed was 50.8 m/minute. During winter months a tagged fish moved out of waters with low oxygen levels in the north bay of Black Lake to areas with a more abundant supply of oxygen. The monthly home range size of the muskellunge varied from 0.2 to 2.7 ha in Black Lake and from 2.3 to 27.7 ha in Moose Lake. Four spawning areas were identified and spawning activities were observed. Muskellunge moved onto spawning grounds when water temperatures reached 8-10°C and remained on spawning grounds until temperatures reached about 14°C. Spawning occurred at night in depths less than 1 m over muck/sand bottoms with much debris and dead vegetation. Spawning areas were also approximately 1.5°C warmer than adjacent waters.

80-000357 DuRant, D. F.; Shireman, J. V.; Gasaway, R. D. REPRODUCTION, GROWTH AND FOOD HABITS OF SEMINOLE KILLIFISH, /FUNDULUS SEMINOLIS/, FROM TWO CENTRAL FLORIDA LAKES. Am. Midl. Nat. 102 (1): 127-133. July 1979. SFA 25(1)
[Sch. For. Resour. Conserv., Univ. Fla., Gainesville 32611] Seminole killifish (/Fundulus seminolis/) were collected form Lake Wales, Florida, from October 1974 to June 1976 and from Star Lake during February and April 1976. Peak spawning was in April and May, but was prolonged and intermittent throughout the year. The highest gonadosomatic index for adult females (5.17) was in April, the lowest (0.01) in November. Probable spawning over /Vallisneria/ sp. was seen in March 1976. Fish spawned in 1975 grew approximately 9 mm/month. Maximum size (160+ mm) was reached in 14-18 months. Chironomids were the principal food of the adult fish: amphipods, fish eggs and plant seeds were of lesser importance. Fish under 45 mm TL ate mostly chironomids, cladocerans and ostracods. Wegener ring samples were negatively correlated with mean size of fish and gave best estimate of relative abundance for small and medium-sized fish. Seine sampling did not select for size but electrofishing sampled mostly larger fish.

80-000358 Durkee, P.; Paulson, B.; Bellig, R. SHOVELNOSE STURGEON (/SCAPHIRHYNCHUS PLATORHYNCHUS/) IN THE MINNESOTA RIVER. J. Minn. Acad. Sci. 45 (2): 18-20. 1979. SFA 25(1)
[Bemidji State Univ., Bemidji, MN] The shovelnose sturgeon, /Scaphirhynchus platorhynchus/, according to Eddy and Underhill (1974) has not been reported from the Minnesota River for a number of years. Recently, Wilcox /et. al./ (1978) reported a single adult taken in 1974, and two others in 1976. Our survey of the fishes in the Minnesota River showed a substantial number of shovelnose sturgeon, at least in certain locations. Twenty specimens were taken in 42 gill net days. Other data obtained included food habits and age-length relationships. Food habits were determined through volumetric analysis of stomach contents, and ages were obtained by sectioning the marginal

80-000358 CONTINUED
pectoral fin ray. The food analysis showed the sturgeon's diet to consist mainly of larval stages of Ceratopogonidae, Chironomidae, Tricoptera, Plecoptera, Diptera, and Coleoptera. The ages of the sturgeon ranged from four to fifteen years, while the fork lengths were from 54 to 76 centimeters.

80-000359 Eldon, G. A. HABITAT AND INTERSPECIFIC RELATIONSHIPS OF THE CANTERBURY MUDFISH, /NEOCHANNA BURROWSIUS/ (SALMONIFORMES: GALAXIIDAE). N.Z. J. Mar. Freshwater Res. 13 (1): 111-119. 1979. SFA 25(1)

[Fish. Res. Div., Minist. Agric. Fish., Private Bag, Christchurch, New Zealand] /Neochanna burrowsius/ (Phillipps) inhabits some streams at low altitudes between latitudes 43°55'S and 44°55'S in Canterbury, New Zealand. Some Habitats contain almost no open water because of concealing vegetation; others have large expanses of open, impounded water. The true habitat appears to be very slow flowing, winding, swampy streams that contain deep pools capable of storing water for long periods if flow ceases. Land drainage may have eliminated this mudfish from some places, but it has adapted to man-modified conditions in others, and may have increased in numbers in recent years. Ability to sometimes survive drought stems from its adaptation to habitats subject to low dissolved oxygen levels: there is no preparation for aestivation. Usually no other fish species are associated with it in the temporary waters it sometimes inhabits, but /Gobiomorphus breviceps/, /G. cotidianus/, /Anguilla australis/, /A. dieffenbachii/, /Galaxias maculatus/, and /G. vulgaris/ are native fishes sometimes found in association with it in permanent waters. /Salmo trutta/ and /Perca fluviatilis/ are exotic species that have been found in the same waters as /N. burrowsius/. It has been found in the stomachs of eels, trout, and perch.

80-000360 Eleftheriou, A. SANDY BEACHES AS FLATFISH NURSERIES. Scott. Fish. Bull. 45: 23-26. 1979. SFA 25(1)

80-000361 Gaygalas, K. S.; Blatnene, D. P.; Pyatravichyute, G. V. ON SOME MORPHOECOLOGICAL PECULIARITIES, POPULATION STRUCTURE AND EXPLOITATION OF STOCKS OF THE WHITE BREAM, /BLICCA BJOERKNA/, IN COURLAND LAGOON. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 386-393. 1978. SFA 25(1)

[Inst. Zool. Parasitol., Lithuanian SSR Acad. Sci., Vilnius, USSR]

80-000362 Hambrick, P. S.; Robison, H. W. LIFE HISTORY ASPECTS OF THE PALEBACK DARTER, /ETHEOSTOMA PALLIDIDORSUM/ (PISCES: PERCIDAE), IN THE CADDO RIVER SYSTEM, ARKANSAS. Southwest. Nat. 24 (3): 475-484. 15 Sept. 1979. SFA 25(1)

[Chateau Cleary Apt., Apt. 408, 3900 I-10 Service Rd., Metairie, LA 70001] Further observations on the restricted distribution and additional habitat notes are provided for the paleback darter, /Etheostoma pallididorsum/, that support concerns for its survival. A Status of threatened is consequently recommended. Several aspects of feeding and reproductive biology of this darter were obtained from analysis of gut contents and gonadal conditions. Dominant food items were cladocerans, ephemeropterans, and dipteran larvae, while maximum spawning activity appears to occur in February and March, ending by early summer. The more serious threats to survival and suggested conservation measures are discussed.

80-000363 Harrison, E. J.; Hadley, W. F. BIOLOGY OF MUSKELLUNGE (/ESOX MASQUINONGY/) IN THE UPPER NIAGARA RIVER. Trans. Am. Fish. Soc. 108 (5): 444-451. Sept. 1979. SFA 25(1)
[Dep. Biol. Pesq., Fund. LaSalle, Isla de Margarita, Venezuela]

80-000364 Heins, D. C. A COMPARATIVE LIFE HISTORY OF A CLOSELY RELATED GROUP OF MINNOWS (/NOTROPIS/, CYPRINIDAE) INHABITING STREAMS OF THE GULF COASTAL PLAIN. Ph.D. dissertation, Tulane Univ. 168p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(3):1082. Sept. 1979. SFA 25(1)

80-000365 Hubbs, C.; Dean, S. M. GROWTH AND REPRODUCTIVE RESPONSES OF /MENIDIA BERYLLINA/ (ATHERINIDAE) INHABITING LAKE TEXOMA. Southwest. Nat. 24 (3): 546-549. 15 Sept. 1979. SFA 25(1)
[Dep. Zool., Univ. Tex. Austin, Austin 78712]

80-000366 Hureau, J.-C.; Geistdoerfer, P.; Rannou, M. THE ECOLOGY OF DEEP-SEA BENTHIC FISHES. Sarsia 64 (1/2): 103-108. 1979. SFA 25(1)
[Mus. Natl. Hist. Nat., Lab. Ichtyol., 43 rue Cuvier, 75231 Paris Cedex 05, France] Despite the relative stability of physico-chemical factors of the deep sea, it has been shown that a cyclic activity exists in the growth, reproduction, and feeding of some abyssal fishes. Viviparity and hermaphroditism are two rather frequent phenomena among such fishes. The trophic ecology of different species is particularly interesting, because it makes it possible to distinguish several ecological types and to refute certain false ideas such as 'Macrourids are sediment eaters'. Euryphagy and microphagy seem to constitute adaptations to life in abyssal regions. Growth which has been studied mainly in macrourids, appears to be definitely much slower than in fishes belonging to other biotopes. Geographical distribution is quite noteworthy when it concerns abyssal fish: for example, a single species can be found at antipodal points. The deep-sea currents have a particular role in the faunal exchanges between the great ocean basins.

80-000367 Kobylinski, G. J.; Sheridan, P. F. DISTRIBUTION, ABUNDANCE, FEEDING AND LONG-TERM FLUCTUATIONS OF SPOT, /LEIOSTOMUS XANTHURUS/, AND CROAKER, /MICROPOGONIAS UNDULATUS/, IN APALACHICOLA BAY, FLORIDA, 1972-1977. Contrib. Mar. Sci. 22: 149-161. Aug. 1979. SFA 25(1)
[Bur. Water Anal., Fla. Dep. Environ. Regulation, Tallahassee 32301] Seasonal distribution, abundance and trophic functions of /Leiostomus xanthurus/ and /Micropogonias undulatus/ were studied at a series of stations in Apalachicola Bay, Florida. Highest catch/effort of spot was found in upper East Bay and East Bay. Apalachicola Bay and East Bay yielded the greatest catch/effort of croaker. Abundance of the two species peaked in the spring and declined in the fall. Stomach contents showed croaker and spot are primarily omnivorous. Principal foods of spot included polychaetes, harpacticoid copepods, detritus and bivalves. Croaker consumed primarily polychaetes and detritus. Comparison of diets of croaker and spot revealed high intraspecific similarity on a size class basis and high interspecific similarity on an areal basis. Population fluctuations and spatial distribution of croaker and spot were studied as a response to a number of environmental and trophic factors. Presence or absence of benthic macrophytes, salinity, color and turbidity, bottom type and food availability determined the long-term spatial distribution of the two fishes. Temperature is a critical parameter for at least one of these

80-000367 CONTINUED
species while variations in rainfall and river flow have little effect on either population.

80-000368 MacKay, K. T. SYNOPSIS OF BIOLOGICAL DATA OF THE NORTHERN POPULATION ATLANTIC MACKEREL (/SCOMBER SCOMBRUS/). Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 885. vi + 26p. June 1979. In English with French summ. SFA 25(1)
[Bedford Inst. Oceanogr., Dartmouth, NS, Canada] The northern population of Atlantic mackerel, /Scomber scombrus/ L., spawns in the Magdalen Shallows during June. The adults remain in the Gulf of St. Lawrence where they build up fat while feeding on zooplankton. Juvenile fish are found in inshore areas of the Canadian Atlantic from July to October. They feed on larger food particles than the adults. Mackerel leave Canadian waters in October. The southern population spawns south of Long Island during April-May and moves northward to the Gulf of Maine during summer. Stragglers may occasionally reach Canadian waters. Both populations overwinter in deep water along the Continental Slope where they have been heavily exploited by a winter fishery which peaked at 386,000 metric tons (MT) in 1972. Two year-classes have dominated the northern population; both have grown slower and matured later than the other year-classes. Somatic weights and gonad weights vary from year to year but seasonal variations are greater than yearly variations. While ovaries and testes do not differ in weight, the dry weight content of ovaries is higher. Mackerel are obligate schoolers during the day. School size varies from 1000 fish in St. Margaret's Bay to 10,000 fish on the north shore of Prince Edward Island and to 80,000 fish during winter in the Georges Bank area.

80-000369 Magomedov, G. M.; Murzabekova, N. M. FEEDING AND GROWTH OF THE YOUNG AUTUMN CHUM SALMON, /ONCORHYNCHUS KETA/, ACCLIMATIZED IN THE CASPIAN SEA DURING THE RIVER PERIOD OF LIFE. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 683-686. 1978. SFA 25(1)
[Dagestan Dep., Caspian Fish. Res. Inst., Makhachkala, USSR]

80-000370 McCosker, J. E.; Lagios, M. D. THE BIOLOGY AND PHYSIOLOGY OF THE LIVING COELACANTH. Calif. Acad. Sci. Occas. Pap. No. 134. 175p. 22 Dec. 1979. SFA 25(1)
[Calif. Acad. Sci., Golden Gate Park, San Francisco, CA 94118]

80-000371 Michaelson, D. M.; Sternberg, D.; Fishelson, L. OBSERVATIONS ON FEEDING, GROWTH AND ELECTRIC DISCHARGE OF NEWBORN /TORPEDO OCELLATA/ (CHONDRICHTHYES, BATOIDEI). J. Fish Biol. 15 (2): 159-163. Aug. 1979. SFA 25(1)
[Dep. Biochem., George S. Wise Fac. Life Sci., Tel-aviv Univ., Tel-aviv, Israel] Newly born and neonate /Torpedo ocellata/ were obtained from gravid females caught during the autumn off the Mediterranean coast of Israel. The young torpedos, which weighed about 11 g, were fed with live /Blennius pavo/ Risso, and doubled their weight in about 4 months. The behaviour of the torpedo during feeding was examined and photographed. When attacking a fish, the torpedo emerges from being buried in the sand and assaults the approaching prey. First, the prey is trapped under the torpedo and then directed towards the ray's mouth by its body movements. Newborn and neonate torpedos are able to discharge their electric organ. The amplitude of the discharge of one day-old fish is approximately 4 V. It increases dramatically during the first three weeks of life to 20 V, reaching an asymptotic level of about 26 V, by the end of the fourth month.

80-000372 Moffett, A. W.; McEachron, L. W.; Key, J. G. OBSERVATIONS ON THE BIOLOGY OF SAND SEATROUT (/CYNOSCION ARENARIUS/) IN GALVESTON AND TRINITY BAYS, TEXAS. Contrib. Mar. Sci. 22: 163-172. Aug. 1979. SFA 25(1)

[Tex. Parks Wildl. Dep., Seabrook Mar. Lab. 77586] Sand seatrout (/Cynoscion arenarius/) is of commercial and recreational importance to the Gulf states. Spawning behavior, feeding habits, length-weight relationships and standard length-total length relationships were determined for 498 sand seatrout collected between May 1966 and March 1968 from Galveston and Trinity Bays, Texas and from the Gulf of Mexico near Galveston Island. Sand seatrout distribution, gonadal development and the time young-of-the-year appeared in estuaries indicated that this species spawns near Gulf-to-bay passes in the Gulf of Mexico between March and August with a spawning peak during spring. Fish and crustaceans dominated the diet of sand seatrout, crustaceans occurred more frequently in fish less than 160 mm SL and fish predominated in those greater than 160 mm SL. The length-weight regressions derived from 267 sand seatrout 125-375 mm SL differed between sexes. The standard length-total length relationship was TL=0.7 + 1.1 SL.

80-000373 Nagelkerken, W. P. BIOLOGY OF THE GRAYSBY, /EPINEPHELUS CRUENTATUS/, OF THE CORAL REEF OF CURACAO. Stud. Fauna Curacao Other Caribb. Isl. 60 (186): 1-118. 1979. SFA 25(1)

[Caraibisch Mar.-Biol. Inst., Curacao]

80-000374 Reimers, N. A HISTORY OF A STUNTED BROOK TROUT POPULATION IN AN ALPINE LAKE: A LIFESPAN OF 24 YEARS. Calif. Fish Game 65 (4): 196-215. Oct. 1979. SFA 25(1)

[Sierra Nevada Aquatic Res. Lab., Star Route 1, Box 198, Mammoth Lakes, CA 93546] The last known survivor of an experimentally stocked population of brook trout lived well into its 24th year of life in a small, High Sierra lake. This extreme longevity doubles previous age record for the species and is attributed to a combination of food scarcity, low temperature, and a remote environment where the influence of angling was negligible. As a consequence of early overcropping and decimation of invertebrate food organisms, semistarvation and stunting continued throughout the lives of originally stocked trout. Natural propagation was repressed until age 16 years. Growth was near normal for the few second-generation fish, which arrived late enough to inherit improved forage due to attrition of the parent generation. Laboratory culture of some of the aging trout (12-18 years) demonstrated capacity for regrowth with sustained nutrition. A breeding experiment with 14-year-olds produced no viable offspring, but cross-fertilization with young brook trout indicated limited fertility in both sexes at advanced age. Histological evaluations at ages 12, 13, 14, and 18 years sought to correlate degenerative changes in vital systems with chronological age. Old trout were distinguishable from their young counterparts only by minor, "wear-and-tear" changes until very late in life. Gross developmental anomalies were found in generative cells and tissues of nearly all mature specimens examined but could not be definitely linked to physiological aging. Fin-clipped individuals permitted identification of the stocked group for 19 years. Otoliths were used to verify ages up to 24 years.

80-000375 Richards, S. W.; Mann, J. M.; Walker, J. A. COMPARISON OF SPAWNING SEASONS, AGE, GROWTH RATES, AND FOOD OF TWO SYMPATRIC SPECIES OF SEAROBINS, /PRIONOTUS CAROLINUS/ AND /PRIONOTUS EVOLANS/, FROM LONG ISLAND SOUND. Estuaries 2 (4): 255-268. Dec. 1979. SFA 25(1)
[Little Harbor Lab., 69 Andrews Rd., Guilford, CT 06437] Both species entered the Sound in April and spawned during June and July. /P. evolans/ appeared to spawn slightly earlier in summer than /P. carolinus/. Adults began to leave the Sound after spawning and were usually absent after November. Young-of-the-year were taken regularly from August to November and, occasionally in water over 20 m deep, into February when the bottom water temperature was 1.4°C. At the end of the first growing seasons both species exhibited large variations in standard lengths. Back-calculations from scale annuli measurements indicated that linear growth rates during the juvenile years were similar in both species. However, /P. evolans/ was considerably heavier than /P. carolinus/. During adulthood /P. evolans/ was not only longer and heavier than /P. carolinus, but lived longer. Growth rates are described by the following equations: /P. carolinus/ $L(t+1) = 9.60 + 0.68\ (L(t))$ and /P. evolans $L(t+1) = 7.70 + 0.80\ (L(t))$. Both species were opportunistic feeders, and crustaceans were clearly the dominant group of prey. Young-of-the-year, between 3-6 cm, ate copepods. As they grew they ate larger prey, such as /Neomysis americana/, /Diastylis quadrispinosus/, various species of amphipods of small sizes, and juvenile /Crangon septemspinosus/. Older fish ate larger sizes of these same prey, a number of species of crabs, juvenile /Homarus americanus/, and /Squilla empusa/. Occasionally they ate polychaetes, molluscs, and junvenile fish. Partitioning of the resources of Long Island Sound by these two species appeared to be by prey size. /P. evolans ate prey that, on the average, were slightly larger than those eaten by /P. carolinus/. Furthermore, /P. evolans/ ate a greater amount of nektonic species than /P. carolinus/, which appeared to prefer benthonic invertebrates.--From abstr.

80-000376 Schmidt, R. E.; Whitworth, W. R. DISTRIBUTION AND HABITAT OF THE SWAMP DARTER (/ETHEOSTOMA FUSIFORME/) IN SOUTHERN NEW ENGLAND. Am. Midl. Nat. 102 (2): 408-413. Oct. 1979. SFA 25(1)
[Biol. Dep., Fordham Univ., Bronx, NY 10458] Selected aspects of the ecology of the swamp darter (/Etheostoma fusiforme/) were investigated to verify its distribution, to collect life history data and to reconstruct its geographic history in southern New England. The unusual distribution pattern in Connecticut was confirmed. Ponds with vegetation and detrital sediments were preferred habitats of this species. Stream populations were very small and probably depended on pond populations for recruitment. Important food items of /E. fusiforme/ in Connecticut were midges and Cladocera. Individuals with more than one annulus were never captured. We postulate that /E. fusiforme/ entered New Engladn via the eastern tip of Long Island very late in postglacial time and that the distribution in Connecticut is a result of postglacial drainage patterns and dispersal through extinct and extant intersystem connections.

80-000377 Silverman, M. J. BIOLOGICAL AND FISHERIES DATA ON BLACK DRUM, /POGONIAS CROMIS/ (LINNAEUS). Natl. Mar. Fish. Serv. Sandy Hook Lab. Tech. Ser. Rep. No. 22. vii + 35p. Oct. 1979. SFA 25(1)
[NMFS, Sandy Hook Lab., NJ]

80-000378 Usynin, V. F. THE BIOLOGY OF THE CHULYM RIVER STERLET, /ACIPENSER RUTHENUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 544-555. 1978. SFA 25(1)
[Dep. Ichthyol. Hydrobiol., Tomsk Univ., USSR]

80-000379 van den Broek, W. L. F. ASPECTS OF THE BIOLOGY OF /SPRATTUS SPRATTUS/ (L.) IN THE MEDWAY ESTUARY. J. Fish Biol. 15 (4): 437-447. Oct. 1979. SFA 25(1)
[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19-062, Wellington, New Zealand] Fish samples were taken monthly over an eight-hour day period between 1973 and 1975. In addition, separate night samples were collected during 1974-75. The present study considers the sprat component of the catch and examines aspects of the fish's biology and its accumulation of chlorinated hydrocarbon compounds and heavy metals. Sprats were present on every sampling date and, generally, totals were highest during late autumn/early winter. They formed 61.1 percent of the catch by numbers and 17.5 percent by weight. Night samples contained an unexpectedly large number of sprats and with mean lengths significantly greater than those in day samples. Changes in monthly length-frequency distributions suggested double spawning during 1974, perhaps the result of a mild winter. Sprats were infected with two copepod ectoparasites; /Lernaeenicus sprattae/ (Sowerby) and /L. encrasicola/ (Turton). In each case infection was low, affecting only 6.6 and 0.9 percent of the population respectively. Levels of chlorinated hydrocarbons and heavy metals were also low in whole sprat tissue. Values of total DDT, dieldrin and PCBs were at a maximum in winter and minimum in spring. Heavy metal results showed no seasonal pattern.

80-000380 Yoshida, H. O. SYNOPSIS OF BIOLOGICAL DATA ON TUNAS OF THE GENUS /EUTHYNNUS/. NOAA Tech. Rep. NMFS Circ. 429. iv + 57p. Oct. 1979. SFA 25(1)
[NMFS, Southwest Fish. Cent. Honolulu Lab., Honolulu, HI 96812]

## POPULATION STUDIES, PRODUCTION, ETC.

80-000381 Birman, I. B. ON THE SIMILARITY IN THE POPULATION DYNAMICS OF THE CANADIAN SALMON, /SALMO SALAR/, AND THE AMUR AUTUMN CHUM, SALMON, /ONCORHYNCHUS KETA/ INFRASPECIES /AUTUMNALIS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 672-677. 1978. SFA 25(1)
[Pac. Ocean Inst. Sea Fish. Oceanogr., Petropavlovsk-Kamchatskiy, USSR]

80-000382 Goldspink, C. R. THE POPULATION DENSITY, GROWTH RATE AND PRODUCTION OF ROACH /RUTILUS RUTILUS/ (L.) IN TJEUKEMEER, THE NETHERLANDS. J. Fish Biol. 15 (4): 473-498. Oct. 1979. SFA 25(1)
[Dep. Biol. Sci., Manchester Polytech., Chester St., Manchester, England] A method of estimating the population density of roach in Tjeukemeer (21.3 km$^2$) using 20,529 introduced fin-clipped fish is described. Fyke nets proved to be an effective method of sampling the population for marked fish during the spawning season. A total of 20,277 roach were processed during the recapturing period. The population density of roach (≥ 14 cm) was estimated to be 1,246,458. The growth rate of roach in the lake although relatively poor (von Bertalanffy's L infinity for males and females, 22 and 26 cm respectively) for the species was similar to that recorded in three other Fresian lakes. The

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mortality rate of males was higher than that of females. Logarithmic length-weight regression analyses showed that the value of the coefficient varied both within and between the sexes, that of females being higher (range 3.038-3.375) than that of males (range 2.760-3.254). Seasonal changes in the size of the coefficient were due to a disproportionate loss of gonad weight in larger fish. The fecundity of the population was comparatively high for the species. The total production of the population was estimated to be 95 kg $ha^{-1}$ of which 39 kg $ha^{-1}$ was contributed by fry. In older (≥ IV) fish the production of females (12 kg $ha^{-1}$) exceeded that (2 kg $ha^{-1}$) of males, due to differences in their growth and mortality rates. The relatively poor performance of roach in Tjeukemeer, in terms of biomass and production was due to a scarcity of zoobenthos and competition from other species of fish. There is no evidence either from this study or the literature that the productive potential of roach in lakes is high, even though macrophytes and detritus can be consumed in significant amounts.

80-000383 Milner, N. J.; Gee, A. S.; Hemsworth, R. J. RECRUITMENT AND TURNOVER OF POPULATIONS OF BROWN TROUT, /SALMO TRUTTA/, IN THE UPPER RIVER WYE, WALES. J. Fish Biol. 15 (2): 211-222. Aug. 1979. SFA 25(1)
[UWIST Field Cent., Newbridge on Wye, Llandrindod Wells, Powys, Wales] The age structure, abundance, net immigration and loss of trout populations were investigated in eleven tributary sites and two main river sites on the River Wye. Marking experiments indicated that recruitment to the site populations was mainly by immigration which began during the 0-group phase and continued, with seasonal fluctuations, throughout life. Immigrant fish had a higher probability of being lost from the populations than residents providing a statistical distinction between mobile and sedentary components of the population. The turnover of the site populations is described using a simple exponential model, and half-times at different sites (stream length, 50 m) ranged from 140 to 430 days. Some factors affecting half-times are briefly discussed.

80-000384 Murawski, S. A.; Waring, G. T. A POPULATION ASSESSMENT OF BUTTERFISH, /PEPRILUS TRIACANTHUS/, IN THE NORTHWESTERN ATLANTIC OCEAN. Trans. Am. Fish. Soc. 108 (5): 427-439. Sept. 1979. SFA 25(1)
[NMFS, Woods Hole, MA 02543]

80-000385 Pella, J. J.; Robertson, T. L. ASSESSMENT OF COMPOSITION OF STOCK MIXTURES. NOAA Fish. Bull. 77 (2): 387-398. Apr. 1979. SFA 25(1)
[NMFS, P.O. Box 155, Auke Bay, AK 99821]

80-000386 Thorne, R. E. HYDROACOUSTIC ESTIMATES OF ADULT SOCKEYE SALMON (/ONCORHYNCHUS NERKA/) IN LAKE WASHINGTON, 1972-75. J. Fish. Res. Board Can. 36 (9): 1145-1149. Sept. 1979. In English with French summ. SFA 25(1)
[Fish. Res. Inst., Coll. Fish., Univ. Wash., Seattle 98195]

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

80-000387 Altukhov, K. A. ON THE REPRODUCTION AND ABUNDANCE OF THE LESSER SAND LANCE, /AMMODYTES MARINUS/, IN THE WHITE SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 560-567. 1978. SFA 25(1)
[L'vov Dep. Ukrainian Fish. Res. Inst., USSR]

80-000388 Apekin, V. S.; Vilenskaya, N. I. A DESCRIPTION OF THE SEXUAL CYCLE AND THE STATE OF THE GONADS DURING THE SPAWNING MIGRATION OF THE STRIPED MULLET, /MUGIL CEPHALUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 446-456. 1978. SFA 25(1)
[VNIRO, Moscow, USSR] The results are given of an investigation of migrations and of peculiarities of functioning of the gonads of the striped mullet, /Mugil cephalus/, entering the Sea of Azov to feed. Gonads from stages II-III up to functional maturity develop during the prespawning period. The spawning migration lasts from the beginning of June to the middle of August. The ripeness of females fluctuates considerably in the schools. The growth and final size of the oocytes evidently depend on temperature conditions during foraging. A set of characters for the selection of females from which ripe ova can be obtained was investigated.

80-000389 Atkinson, D. B.; Carscadden, J. E. BIOLOGICAL CHARACTERISTICS OF INSHORE CAPELIN, /MALLOTUS VILLOSUS/ (MULLER), JUNE-JULY 1977. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 881. iv + 18p. May 1979. In English with French summ. SFA 25(1)
[Fish. Mar. Serv., P.O. Box 5667, St. John's, NF A1C 5X1, Canada] During the period late May to early July 1977, capelin were collected during a project conducted in Conception and Trinity bays by the Industrial Development Branch of the Fisheries and Marine Service to investigate the commercial feasibility of selectively harvesting ripe female capelin during their spawning period in inshore Newfoundland waters. Capelin schools were classified into five types according to size and density as observed from echo sounder records. Schools became larger and denser as the spawning season progressed and denser schools were usually found in shallower water. Sets made from the beach yielded a high percentage of male capelin while sets made from the purse seiner yielded catches containing 24-87 percent females. Older and larger fish predominated early in the season. Examination of gonads confirmed the results of earlier studies that males mate over an extended period, but females spawn during a very short period.

80-000390 Beumer, J. P. REPRODUCTIVE CYCLES OF TWO AUSTRALIAN FRESHWATER FISHES: THE SPANGLED PERCH, /THERAPON UNICOLOR/ GUNTHER, 1859 AND THE EAST QUEENSLAND RAINBOWFISH, /NEMATOCENTRIS SPLENDIDA/ PETERS, 1866. J. Fish Biol. 15 (1): 111-134. July 1979. SFA 25(1)
[Fish. Wildl. Div., Arthur Rylah Inst. Environ. Res., Brown St., Heidelberg, Victoria 3084, Australia] The reproductive cycles of the spangled perch /Therapon unicolor/ Gunther, 1859 and the East Queensland rainbowfish /Nematocentris splendida/ Peters, 1866 are described in terms of maturity stages, sex-ratio, gonosomatic indices, oocyte diameters, fecundity and rearing experiments. /T. unicolor/ has a well-defined reproductive cycle with gonad development stimulated by rising temperatures and increasing daylength; with spawning induced by the 'wet', possibly by rising water levels and increasing turbidities. In contrast, /N. splendida/ has a protracted spawning period with a peak of spawning activity in pre-flood and flood periods, although

80-000390 CONTINUED
individuals in spawning condition and juveniles may be found throughout the year.

80-000391 Chebanov, N. A. BEHAVIOR AND MATE SELECTION AMONG CHUM BROOK STOCK OF DIFFERENT SIZES WITH A PREDOMINANCE OF MALES IN THE SPAWNING GROUNDS. Sov. J. Ecol. (Engl. Transl. Ekologiya) 10 (2): 141-146. Nov. 1979. SFA 25(1)
[Kamchatka Sect., Pac. Res. Inst. Fish. Oceanogr., USSR] The behavior of 8 females and 23 chum males (/Oncorhynchus keta/, Walbaum) labeled with cloth labels was studied in spawning ground. The predominance of males resulted in the selection of adults of similar size in comparison with spawning pairs only among average and large fish. The use of unique indices (intensity of active and inactive migration in the spawning grounds, spawning activity, incomplete utilization of sexual products, life span in the spawning ground) permitted the evaluation to a certain extent of the role of males from different size groups during spawning.

80-000392 Dahlgren, B. T. THE EFFECTS OF POPULATION DENSITY ON FECUNDITY AND AND FERTILITY IN THE GUPPY, /POECILIA RETICULATA/ (PETERS). J. Fish Biol. 15 (1): 71-91. July 1979. SFA 25(1)
[Dep. Anim. Ecol., Univ. Lund, Ecol. Bldg., S-223 62 Lund, Sweden] The frequency of females with only ova or with different combinations of reproductive units and developmental stages in the ovary was significantly different between different densities but not between females with one and two gestations from the same population density. The ovarian width of females with one gestation from the lowest density was significantly larger than in the highest population density. gonad length and height and ovarian volume of females with two gestation periods were larger in the lowest compared with the highest density. After one gestation, females at the lowest population level had greater ovarian length, height, gonad weight, width and volume compared with those from the higher density. Ovarian length, height and volume and gonad weight were also significantly greater among females of two gestation periods in the lowest than in the second lowest density. The average gonadosomatic ratio was highest in the lowest population density. A significant correlation was found between gonad volume and total body weight and between gonad volume and ovarian weight of females at every population level. This was also the case when ovarian weight vs. total body weight was examined in each population density. Only at the lowest population level was there a significant correlation between fecundity and total body length and between fertility and body length. A significant relationship was also found between gonad volume and total body length and between gonad weight and body length at the same population level. No significant difference of fecundity and ovum size was found between females of one and two gestation periods from the same density. Fecundity and fertility were significantly higher among females of one and two gestation periods from the lowest than from the highest density.-From abstr.

80-000393 Datta Munshi, J. S.; Bilgrami, K. S.; Saha, M. P.; Johar, M. A. O. SURVEY OF FISH-SPAWN COLLECTION GROUNDS IN THE RIVER GANGES. Environ. Conserv. 6 (2): 153-157. 1979. SFA 25(1)
[Postgrad. Dep. Zool., Bhagalpur Univ., Bhagalpur-812007, Bihar, India]

80-000394 Fricke, H. W. MATING SYSTEM, RESOURCE DEFENCE AND SEX CHANGE IN THE ANEMONEFISH /AMPHIPRION AKALLOPISOS/. J. Comp. Ethól. 50 (3): 313-326. July 1979. In English with German summ. SFA 25(1)
[Max Planck Inst. Verhaltensphysiol., D-8131, Seewiesen, West Germany]

80-000395 Geistdoerfer, P. NEW DATA ON THE REPRODUCTION OF MACROURIDS (TELEOSTEI, GADIFORMES). Sarsia 64 (1/2): 109-112. 1979. SFA 25(1)
[Mus. Natl. Hist. Nat., 43 rue Cuvier, 75231 Paris Cedex 05, France]

80-000396 Habib, G. REPRODUCTIVE BIOLOGY OF THE PUFFERFISH, /URANOSTOMA RICHEI/ (PLECTOGNATHI: LAGOCEPHALIDAE), FROM LYTTELTON HARBOUR. N.Z. J. Mar. Freshwater Res. 13 (1): 71-78. 1979. SFA 25(1)
[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19062, Wellington, New Zealand] The gonads of 15,163 pufferfish, /Uranostoma richei/ (Freminville), taken from Lyttelton Harbour, South Island, New Zealand between June 1969 and May 1970 were examined: 8892 were female, 6271 male. A smaller number of gonads and livers were examined in detail. The occurrence of fish at different stages of gonad development during the year, and associated changes in gonad weight, were used to define the breeding season as October to March. Peak spawning occured in December; spawning fish were over 7.5 cm in length, 9 g in weight, and 2 years of age. Fecundity (counts of eggs over 0.4 mm diam.) was proportional to the cube of fish length, and ranged from 5000 in a fish of 8 cm to 100,000 in an 18-cm-long fish. There was some evidence that the liver acts as a food store that is utilised in gonad development before spawning.

80-000397 Hawkins, A. D.; Urquhart, G. G.; Shearer, W. M. THE COASTAL MOVEMENTS OF RETURNING ATLANTIC SALMON, /SALMO SALAR/ L. Scott. Fish. Res. Rep. No. 15. 14p. 1979. SFA 25(1)
[Mar. Lab., Aberdeen, Scotland]

80-000398 Hlavek, R. R.; Norden, C. R. THE REPRODUCTIVE CYCLE AND FECUNDITY OF THE ALEWIFE IN LAKE MICHIGAN. Wis. Acad. Sci. Arts Letters 66: 80-90. 1978. SFA 25(1)
[Marian Coll., Indianapolis, IN] The alewife population in southen Lake Michigan exhibited a spawning season extending from mid-June to Early August, with a peak in July, as indicated by gonosomal indices and confirmed from histological sections of the ovaries and testes. During the height of spawning, gonads comprised 5 to 6 percent of body weight in males and 8 to 12 percent in females, values approximately nine times as great as in the quiescent season. The relationship between fecundity and total length was expressed as Y=292X-29,719. The correlation coefficient was .44. Fecundity versus ovarian weight was Y=4,819X - 1,262, with a correlation coefficient of .90. Fecundity was related to the gonosomal index by Y=2,352X-3,801, with a correlation coefficient of .71. Gonosomal indices of dying fish revealed various states of sexual development.

80-000399 Jilek, R.; Cassell, B.; Peace, D.; Garza, Y.; Riley, L.; Siewart, T. SPAWNING POPULATION DYNAMICS OF SMELT, /OSMERUS MORDAX/. J. Fish Biol. 15 (1): 31-35. July 1979. SFA 25(1)
[Dep. Zool., Ohio State Univ., Columbus 43210] A total of 1618 /Osmerus mordax/ were collected between 27 April and 5 May 1977 from five spawning sites along Lake Superior. The fish were measured, sexed, and aged to determine spawning population dynamics. Length/weight ratios of males vs. females varied with males' growth initially concentrated towards length, while females' growth was concentrated toward weight. These growth curves reverse after the third-year class. Male /O. mordax/ exhibit a higher coefficient of condition.

80-000400 Lehtinen, S.; Echelle, A. A. REPRODUCTIVE CYCLE OF /NOTROPIS BOOPS/ (PISCES: CYPRINIDAE) IN BRIER CREEK, MARSHALL COUNTY, OKLAHOMA. Am. Midl. Nat. 102 (2): 237-243. Oct. 1979. SFA 25(1)
[Dep. Life Sci., Okla. State Univ., Stillwater] The reproductive cycle of the big eye shiner (/Notropis boops/) in Brier Creek, S-central Oklahoma, is described for 1976 and 1977. Reproduction occurred from late April into August. The breeding season was longer and began earlier in the year than those of northern populations of the species. Ovarian regression began earlier in the 1977 breeding season than in 1976; this coincided with higher summer temperatures and more extreme drought conditions in 1977. Most individuals spawn during their 2nd summer of life with only a few surviving to spawn the following season. None spawn in their year of birth. Egg diameter frequencies suggest that individuals spawn more than one clutch per season. Compared to /Notropis lutrensis/ and /N. venustus/, synoptic congeners of more southern origins, /N. boops/ seemed more sensitive to stressful drought conditions of 1977.

80-000401 Moiseyeva, Ye. B.; Rudenko, V. I. THE SPAWNING OF THE ROUND GOBY, /GOBIUS MELANOSTOMUS/, UNDER AQUARIUM CONDITIONS IN WINTER. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 690-692. 1978. SFA 25(1)
[AzCherNIRO, Kerch, USSR]

80-000402 Nieman, D. A.; Clady, M. D.; Gebhart, G. E. SEXUAL MATURITY OF SMALL YEARLING LARGEMOUTH BASS IN OKLAHOMA. Proc. Okla. Acad. Sci. 59: 51-52. 1979. SFA 25(1)
[Okla. Dep. Wildl. Conserv., 1801 N. Lincoln Blvd., Oklahoma City 73105]

80-000403 Pratt, H. L., Jr. REPRODUCTION IN THE BLUE SHARK, /PRIONACE GLAUCA/. NOAA Fish. Bull. 77 (2): 445-470. Apr. 1979. SFA 25(1)
[NMFS, Narragansett, RI 02882] In the male blue shark, /Prionace glauca/, paired testes produce spermatozoa year round which are stored first in the epididymides, then as spermatophores in the lower ductus deferentia. Spermatozoa are transferred to the female through paired claspers employed singly. Spermatozoa are injected into the upper vagina and pass through the uterus and isthmus into the shell (oviducal) gland, where they are stored until the female is ready for fertilization. Male blue sharks reach maturity at 183 cm fork length when 50 percent possess spermatophores. Females pass through a subadult phase (145-185 cm), when the organs for copulation and sperm storage are developed but the ova are undeveloped. During this phase females receive numerous toothcuts in their thickened dermis as a prelude to mating and frequently copulate. I examined reproductive

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organs from 160 subadult female blue sharks, caught in shelf waters off southern New England during summer months, by histological sectioning to determine if spermatatozoa were present. Of these females, 79 had spermatozoa in the oviducal gland, establishing successful copulation. Inseminated females then emigrate offshore where fertilization occurs the following spring during ovulation. Blue sharks are viviparous and bear young after 9 to 12 months gestation. Thirty-eight new or unpublished accounts of gravid females are investigated, as well as one 192 cm hermaphroditic blue shark. In shelf waters during the summer the sex ratio for subadults is nearly equal while males dominate the adult sizes due to the emigration of inseminated females.

80-000404 Ramanathan, N.; Natarajan, R. BREEDING BIOLOGY OF /PSETTODES ERUMEI/ (BLOCH & SCHN.) AND /PSEUDORHOMBUS ARSIUS/ (HAM. BUCH.) PISCES: PLEURONECTIFORMES ALONG PORTO NOVO COAST (S. INDIA). Aquaculture 18 (3): 269-282. Nov. 1979. SFA 25(1)
[Cent. Adv. Stud. Mar. Biol., Annamalai Univ., Parangipettai 608 502, Tamil Nadu, India] Studies on the development of ova up to maturity clearly indicated that /Psettodes erumei/ and /Pseudorhombus arsius/ breed only once a year for 3 to 4 months in Porto Novo waters. /Psettodes erumei/ spawns its eggs in two batches, while /Pseudorhombus arsius/ spawns in a single batch. The spawning period of /Psettodes erumei/ was from May to September, with the peak from May to August. /Pseudorhombus arsius/ spawns during April to July, with the peak in April and May. Studies on the gonadosomatic indices confirm the above information. The size at first maturity of /Psettodes erumei/ was 371-390 mm total length, and that of /Pseudorhombus arsius/ was between 161 and 170 mm total length. Females always outnumbered males in both the species. Fecundity studies in both species showed direct correlations with total length and body weight.

80-000405 Rothbard, S. OBSERVATIONS ON THE REPRODUCTIVE BEHAVIOR OF /TILAPIA ZILLII/ AND SEVERAL /SAROTHERODON/ SPP. UNDER AQUARIUM CONDITIONS. Bamidgeh 31 (2): 35-43. June 1979. SFA 25(1)
[Fish Aquacult. Res. Stn., Dor, Israel]

80-000406 Savvaitova, K. A.; Maksimov, V. A. THE SPAWNING OF THE ARCTIC LAMPREY OF THE GENUS /LAMPETRA/ IN CONNECTION WITH THE PROBLEM OF THE TAXONOMIC STATUS OF SMALL FORMS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 555-560. 1978. SFA 25(1)
[Dep. Ichthyol., Moscow Univ., USSR]

80-000407 Schofer, W. UNTERSUCHUNGEN ZUR FORTPFLANZUNGSFAEHIGKEIT DER PLOETZE (/RUTILUS RUTILUS/ L.) IM BRACKWASSER. [INVESTIGATIONS ON THE CAPABILITY OF ROACH (/RUTILUS RULTILUS/ L.) TO REPRODUCE IN BRACKISH WATER.] Arch. Hydrobiol. 86 (3): 371-395. 1979. In German with English summ. SFA 25(1)
[Inst. Meereskunde, Univ. Kiel, West Germany] The capability of roach (/Rutilus rutilus/ L.) to reproduce in brackwater was examined by means of artificial propagation and field investigations in the "Schlei", a baltic fjord of northern Germany. Fertilisation success was not affected in the salinities tested (1.8-10.2 °/oo salinity). The rate of water uptake into the eggs was slowed down in salinities of 3.5 °/oo salinity and higher, while the final amount of water taken up in each of these salinities exceeded that of the freshwater control. Egg-shells burst in these salinities long before normal hatching took place in freshwater. Normally built embryos dropped out

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of their shells. The mortality of these embryos increased with salinity. From 8.6 °/oo S upwards a total pregastrulation mortality occurred. For eggs and porlarvae salinities which limited longterm survival lay between 1.8 and 3.5 °/oo salinity. Juveniles could withstand salniities up to 11.5 to 12.7 °/oo. A temperature of 9.6 °C, which was tested up to first food intake, increased the negative influences of salinity in camparison to 14.6 °C. Field investigations upon the occurrence of roach-fry, conducted with a fish-fry beachseine, showed that in the "Schlei" spawning of roach takes place in freshwater sites only.

80-000408 Shikhshabekov, M. M. THE SEXUAL CYCLES OF THE CATFISH, /SILURUS GLANIS/, THE PIKE, /ESOX LUCIUS/, THE PERCH, /PERCA FLUVIATILIS/, AND THE PIKE-PERCH, /LUCIOPERCA LUCIOPERCA/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 457-468. 1978. SFA 25(1)
[Dagestan Agric. Inst., Makhock-Kala, USSR]

80-000409 Spanovskaya, V. D.; Grigorash, V. A. THE REPRODUCTIVE CAPACITY OF /CYCLOTHONE BRAUERI/ IN THE SOUTHERN PART OF THE PACIFIC OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 504-508. 1978. SFA 25(1)
[Dep. Ichthyol., Moscow Univ., USSR] Sexual dimorphism (females larger than males), intermittent spawning, increase in fecundity with linear growth are characteristic of /C. braueri/. The beginning of spawning in the southern part of the Fiji Basin occurs in the first half of January. Females in the spawning population are qualitatively different as regards generative metabolism: this is an adaptation characteristic of the dynamics of abundance of the species in question.--concl.

## MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

80-000410 Casterlin, M. E.; Reynolds, W. W. DIEL ACTIVITY PATTERNS OF THE SMOOTH DOGFISH SHARK, /MUSTELUS CANIS/. Bull. Mar. Sci. 29 (3): 440-442. July 1979. SFA 25(1)
[Biol. Dep., Pa. State Univ., Wilke-Barre 18708] Fourteen smooth dogfish sharks, /Mustelus canis/, collected from bays in Stone Harbor, New Jersey, (12°C, 30 °/oo salinity) were tested individually in an electronic shuttlebox to determine their diel activity patterns. Activity was quantified as interruptions of photocell-monitored light beams as the sharks shuttled between chambers of the device. The sharks were tested under an artifical photoperiod of 8 h photophase, 4 h dusk, 8 h scotophase and 4 h dawn. The sharks exhibited a primarily nocturnal activity pattern, with 45 percent of their total 24-h activity occurring during scotophase, 32 percent during the crepuscular transitions, and 23 percent during photophase. Activity levels increased steadily after onset of scotophase, reaching a peak between 0100 and 0400, and began to decrease prior to onset of "dawn". Nocturnal activity in /M. canis/ may be related to the fact that its crustacean prey are also nocturnal.

80-000411 Dooley, H. D.; McKay, D. W. THE DRIFT OF HERRING LARVAE FROM THE WEST COAST TO THE NORTH SEA. Scott. Fish. Bull. 45: 10-12. 1979. SFA 25(1)

80-000412 Holliday, D. V.; Larsen, H. L. THICKNESS AND DEPTH DISTRIBUTIONS OF SOME EPIPELAGIC FISH SCHOOLS OFF SOUTHERN CALIFORNIA. NOAA Fish. Bull. 77 (2): 489-494. Apr. 1979. SFA 25(1)
[Tracor, Inc., San Diego Lab., 3420 Kenyon St., San Diego, CA 92110] The thickness and vertical distributions of shallow schools of many fish cannot be accurately measured by conventional echo sounding techniques. Consequently, a new approach which makes use of the bottom bounce acoustic propagation path has been developed and used for measurements on northern anchovy schools off southern California. These measurements, at three locations in three different seasons, revealed that the schools occupied a depth zone only a few meters thick. Good agreement was found between occurrence of the mean depths of the schools and the seasonal thermocline, where it is hypothesized that thermal stratification, and associated water density microstructure may lead to an aggregation of some part of the fishes' food supply in thin layers.--Concl.

80-000413 Jellyman, D. J. UPSTREAM MIGRATION OF GLASS-EELS (/ANGUILLA/ SPP.) IN THE WAIKATO RIVER. N.Z. J. Mar. Freshwater Res. 13 (1): 13-22. 1979. SFA 25(1)
[Fish. Res. Div., Minist. Agric. Fish., Private Bag, Christchurch, New Zealand]

80-000414 Robins, C. R.; Cohen, D. M.; Robins, C. H. THE EELS, /ANGUILLA/ AND /HISTIOBRANCHUS/, PHOTOGRAPHED ON THE FLOOR OF THE DEEP ATLANTIC IN THE BAHAMAS. Bull. Mar. Sci. 29 (3): 401-405. July 1979. SFA 25(1)
[Rosenstiel Sch. Mar. Atmos. Sci., 4600 Rickenbacker Causeway, Miami, FL 33149] The first record of an adult eel of the genus /Anguilla/ in the deep sea is reported from nearly 2,000 meters on the bottom of Tongue-of-the-Ocean, Bahamas. The record is based on photographs taken from the submersible ALVIN. Whether it represents /Anguilla anguilla/ or /Anguilla rostrata/ cannot be determined. The basis of the identification is discussed and comments are provided on other eels of the region especially /Histiobranchus/, a synaphobranchid eel also photographed in Tongue-of-the-Ocean. Comments are provided concerning the significance of this discovery to our knowledge of the distribution and biology of /Anguilla/.

## FOODS AND FEEDING

80-000415 Adalsteinsson, H. SIZE AND FOOD OF ARCTIC CHAR /SALVELINUS APLINUS/ AND STICKLEBACK /GASTEROSTEUS ACULEATUS/ IN LAKE MYVATN. Oikos 32 (1/2): 228-231. 1979. In English with Russian summ. SFA 25(1)
[Natl. Energy Auth., Laugaveg 116, Rekjavik, Iceland] The fish community in the lake is described. The age structure of char has changed since 1933 when 7-yr specimens were common. Today individuals older than 5 yr are scarce. The growth rate of 7-8 cm $yr^{-1}$ was the same in 1933 and 1972-73. Only old large female sticklebacks were netted, probably because males are too small. Food was more abundant and diverse in the S- than in the N-basin. In the S-basin the food choice of the char was determined by peaks of the food organisms: in

80-000415 CONTINUED
spring mostly chironomid pupae, during summer benthic crustaceans, mainly /Lepidurus arcticus/ (Pallas) and /Eurycercus lamellatus/ (Muller), and in autumn zooplankton (/Daphnia longispina/ (Muller)). The proportion of chironomid larvae was always considerable. Sticklebacks and /Radix peregra/ were taken when above food items were scarce. Food important in the S-basin was scarce in the N-basin, where sticklebacks and /R. peregra/ were dominant food of the char, representing a case of constrained feeding behaviour. The choice of food varied little with the size of the char (greater than 10 cm). Sticklebacks fed overwhelmingly on benthos, mainly chironomid larvae, /E. lamellatus/ and /Cyclops/. in the N-basin, sticklebacks took /R. peregra/, their own eggs and undigestible trash much more commonly than elsewhere.

80-000416 Balirwa, J. S. A CONTRIBUTION TO THE STUDY OF THE FOOD OF SIX CYPRINID FISHES IN THREE AREAS OF THE LAKE VICTORIA BASIN, EAST AFRICA. Hydrobiologia 66 (1): 65-72. 15 Sept. 1979. SFA 25(1)
[EAFFRO, Jinja, P.O. Box 343, Jinga, Uganda] An account of the food of six species of cyprinid fish from the Lake Victoria basin is given. All the species studied possess tubular stomachs and analysis was carried out on entire guts, the relative importance of the various dietary items being assessed by the frequency occurrence method. Results indicate that these species are omnivorous, and their food ranges from debris, diatoms through algae, insect larvae to molluscs. Comparison of the food of /Barbus/ spp. from the lake and river shows that riverine fish ingest more plant material than lake fish.

80-000417 Blaber, S. J. M. THE BIOLOGY OF FILTER FEEDING TELEOSTS IN LAKE ST LUCIA, ZULULAND. J. Fish Biol. 15 (1): 37-59. July 1979. SFA 25(1)
[Zool. Dep., Univ. Natal, Pietermaritzburg, Natal, South Africa] The biology of filter feeding teleosts in St Lucia, was studied for two years from 1976 to 1978. The three common species, /Gilchristella aestuarius/, /Hilsa kelee/ and /Thryssa vitrirostris/ were studied with the composition and cyclical nature of the zooplankton which formed their food. There was a close correlation between the zooplankton cycles, both diel and annual, and the feeding, reproduction and recruitment of the three common filter feeding teleosts. /G. aestuarius/ spent its whole life-cycle in the system and spawned in early summer when the resulting juveniles could feed on the summer zooplankton peaks. They grew at 0.5 cm month$^{-1}$ and attained maximum size in one year. They were non-selective taking mainly /P. stuhlmanni/ and post-veligers. /H. kelee/ spawned in the sea and juveniles were common in St Lucia during 1978 when they fed non-selectively, chiefly on /P. stuhlmanni/ but also on phytoplankton. Adult /T. vitrirostris/ entered St Lucia in late winter and spawned during the summer before disappearing over the winter. The resulting offspring went through a sequence of dietary changes which were closely related to zooplankton cycles. The importance of /P. stuhlmanni/ in the pelagic food web of St Lucia is illustrated. The species supports not only the filter feeding teleosts but indirectly the predatory fish /Argyrosomus hololepidotus/ and /Elops machnata/ which feed on /G. aestuarius/ and /t. vitrirostris/.--From abstr.

80-000418 Brambilla, D. J. LIFE HISTORIES AND SIZE-SELECTIVE PREDATION IN /DAPHNIA PULEX/. Ph.D. dissertation, Univ. Mich. 211p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(5):2029. Nov. 1979. SFA 25(1)

80-000419 Chan, E. H.; Chua, T. E. THE FOOD AND FEEDING HABITS OF GREENBACK GREY MULLET, /LIZA SUBVIRIDIS/ (VALENCIENNES), FROM DIFFERENT HABITATS AND AT VARIOUS STAGES OF GROWTH. J. Fish Biol. 15 (2): 165-171. Aug. 1979. SFA 25(1)

[Fac. Fish. Mar. Sci., Univ. Agric. Malaysia, Serdang, Selangor, Malaysia] An analysis of the stomach contents of /Liza subviridis/ at various stages of growth and from different habitat types is given. Transitions in diet with respect to size were observed. Postlarval stages of less than 12 mm standard length fed only on zooplankton. The transition to bottom feeding occurred in specimens 16-20 mm, with food items consisting of zooplankton, diatoms, detrital material and inorganic sediment. The transition was complete on attaining a length of 24 mm whereby food items comprised diatoms, detrital material, filamentous algae and inorganic sediment. The relevance of this information in aquaculture is discussed. The stomach contents of adult /Liza subviridis/ taken from different habitat types were consistent, comprising diatoms, detrital material and inorganic sediment. Filamentous algae was also consumed where available.

80-000420 Diggins, M. R.; Summerfelt, R. C.; Mnich, M. A. ALTERED FEEDING ELECTIVITY OF THE BLUEGILL FROM INCREASED PREY ACCESSIBILITY FOLLOWING MACROPHYTE REMOVAL. Proc. Okla. Acad. Sci. 59: 4-11. 1979. SFA 25(1)

[Dep. Biol., Mt. Mary Coll., Yankton, SD 57078] Species diversity and biomass of invertebrates in stomachs of young-of-the-year, 1- and 2-year-old bluegill (/Lepomis macrochirus/) were examined in relation to variation in the benthos of a pond treated with a herbicide. Vascular plant biomass, mainly /Potamogeton/ spp, were nearly eliminated by the treatment; at the 0-1 m depth stratum, the biomass dropped from 481.2 g dry weight per $m^2$ to 0.3 g dry weight per $m^2$. Density of the phytomacrofauna declined but the abundance of detritivorous invertebrates increased in post-treatment collections. Averages of total numbers and biomass of zooplanktonic and benthic organisms in stomachs were larger in the sampling period following treatment. Species diversity (d) of macroinvertebrates in the fish stomachs increased following the herbicide application even though the diversity of macroinvertebrates in the environment declined. Species diversity of the total food ration, including the zooplankton, diminished following treatment because of predator electivity for only the cladoceran species in the zooplankton. The authors suggest that both prey density and vulnerability are of importance in predator selection and that a preferred species, if vulnerable, may be selected even when not relatively abundant.

80-000421 Elshoud-Oldenhave, M. J. W. PREY CAPTURE IN THE PIKE-PERCH, /STIZOSTEDION LUCIOPERCA/ (TELEOSTEI, PERCIDAE): A STRUCTURAL AND FUNCTIONAL ANALYSIS. Zoomorphologie 93 (1): 1-32. 1979. SFA 25(1)

[Zool. Lab., Univ. Leiden, Kaiserstraat 63 2300, RA Leiden, The Netherlands]

80-000422 Eriksson, M. O. G. COMPETITION BETWEEN FRESHWATER FISH AND GOLDENEYES /BUCEPHALA CLANGULA/ (L.) FOR COMMON PREY. Oecologia (Berl.) 41 (1): 99-107. July 1979. SFA 25(1)
[Dep. Zool., Univ. Goteborg, Fack, S-400 33 Goteborg, Sweden] Results of a descriptive field study showed that goldeneyes preferred lakes without fish to those with fish. Field experiments were carried out in order to investigate whether or not this preference could be ascribed to a higher food supply in the lakes devoid of fish, as goldeneyes and some freshwater fish (perch and roach in the studied lakes) to some extent feed on the same kinds of prey. Changes in the abundance of prey common to fish and goldeneyes and the use by goldeneyes of lakes after experimentally changed predation pressure from fish were studied. Some aquatic insect groups, /Cloeon/ larvae, Odonata larvae, water bugs, dytiscids, and /Chaoborus/ larvae, proved sensitive to predation from fish. Goldeneyes increased their use of an experimental lake after fish were removed, and they used this lake more than an adjacent control lake. It is suggested that fish are able to reduce the availability of foods common to the goldeneyes to such an extent that the selection by the ducks of feeding localities is affected, and that exploitation competition between freshwater fish and goldeneyes may occur.

80-000423 Gorelova, T. A. THE FEEDING OF LANTERNFISHES, /CERATOSCOPELUS WARMINGI/ AND /BOLINICHTHYS LONGIPES/, OF THE FAMILY MYCTOPHIDAE IN THE WESTERN EQUATORIAL PART OF THE PACIFIC OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 588-598. 1978. SFA 25(1)
[Inst. Oceanol., USSR Acad. Sci., Moscow, USSR] The feeding of young and adult specimens of /Ceratoscopelus warmingi/ and /Bolinichthys longipes/ was investigated. Copepoda are the main food items of /B. longipes/; /C. warmingi/ Amphipoda and Euphausiacea are also frequently encountered. Interzonal species of these groups of crustaceans predominate in the stomachs of mesopelagic myctophids. The reasons for the differences in the food spectra of Mesopelagic and "near-surface" myctophids are discussed.

80-000424 Gowing, H.; Momot, W. T. IMPACT OF BROOK TROUT (/SALVELINUS FONTINALIS/) PREDATION ON THE CRAYFISH /ORCONECTES VIRILIS/ IN THREE MICHIGAN LAKES. J. Fish. Res. Board Can. 36 (10): 1191-1196. Oct. 1979. In English with French summ. SFA 25(1)
[Mich. Dep. Nat. Resour., Lewiston 49756]

80-000425 Haldorson, L.; Moser, M. GEOGRAPHIC PATTERNS OF PREY UTILIZATION IN TWO SPECIES OF SURFPERCH (EMBIOTOCIDAE). Copeia 1979 (4): 567-572. 28 Nov. 1979. SFA 25(1)
[Dep. Biol. Sci,. Univ. Calif., Santa Barbara 93106] The diets of the pile surfperch (/Damalichthys vacca/) and the striped surfperch (/Embiotoca lateralis/) were examined in seven locations from Puget Sound to Santo Tomas, Baja California, Mexico. The pile surfperch specializes in hard-shelled mollusks, crabs and barnacles, whereas the striped surfperch consistently eats amphipods and bryozoans. Although stiped surfperch utilize a wide range of prey items throughout most of their range, a population adjacent to a gap in distribution utilizes a low diversity of prey items. A reduction in mouth size is associated with the diet restriction observed in the striped surfperch, suggesting that a localized adaptive specialization to a restricted food niche has occurred in marginal populations of that species.

80-000426 Hall, D. J.; Werner, E. E.; Gilliam, J. F.; Mittelbach, G. G.; Howard, D.; Doner, C. G.; Dickerman, J. A.; Stewart, A. J. DIEL FORAGING BEHAVIOR AND PREY SELECTION IN THE GOLDEN SHINER (/NOTEMIGONUS CRYSOLEUCAS/). J. Fish. Res. Board Can. 36 (9): 1029-1039. Sept. 1979. In English with French summ. SFA 25(1)
[Dep. Zool., Mich. State Univ., Hickory Corners, MI 49060]

80-000427 Johnson, J. H.; Ringler, N. H. THE OCCURRENCE OF BLOW FLY LARVAE (DIPTERA: CALLIPHORIDAE) ON SALMON CARCASSES AND THEIR UTILIZATION AS FOOD BY JUVENILE SALMON AND TROUT. Great Lakes Entomol. 12 (3): 137-140. 1979. SFA 25(1)
[N.Y. Dep. Environ. Conserv., 50 Wolf Rd., Albany 12233]

80-000428 Johnson, J. H.; Ringler, N. H. PREDATION ON PACIFIC SALMON EGGS BY SALMONIDS IN A TRIBUTARY OF LAKE ONTARIO. J. Great Lakes Res. 5 (2): 177-181. 1979. SFA 25(1)
[N.Y. State Dep. Environ. Conserv., 50 Wolf Rd., Albany 12233] Diets of salmonids in a tributary of Lake Ontario were examined during the fall of 1977. Pacific salmon eggs accounted for at least 90 percent of the October diet of juvenile steelhead and coho salmon, and adult brook trout and brown trout. In November, salmon eggs comprised 38-95 percent of the diet. Egg consumption appeared to be responsible for large increases in the condition factor of all groups studied. Increased condition may enhance survival during the severe winters charactgeristic of the Tug Hill region.

80-000429 Jones, R. FOOD CHAINS AND OUR FISH SUPPLY. Scott. Fish. Bull. 45: 4-10. 1979. SFA 25(1)

80-000430 Kamlyuk, L. V.; Lyakhnovich, V. P.; Kopylova, T. V. EFFECTIVENESS OF ZOOPLANKTON UTILIZATION IN CARP FORAGING PONDS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 665-669. 1978. SFA 25(1)
[Bel NIIRKh, Minsk, USSR] The degree of utilization of zooplankton in foraging ponds with a differing stocking density of carp, /Cyprinus carpio/, and different levels of intensification is assessed. The amount of zooplankton eaten by two-year old carp during the growing season amounted to 25-47 percent of the total production of zooplankton or 3.0-4.5 percent of the biomass per day. Utilization of zooplankton production accounted for 8-41 percent of the total increase in fish production at food coefficients of zooplankton between 9.3 and 13.4.

80-000431 Kinch, J. C. TROPHIC HABITS OF THE JUVENILE FISHES WITHIN ARTIFICIAL WATERWAYS--MARCO ISLAND, FLORIDA. Contrib. Mar. Sci. 22: 77-90. Aug. 1979. SFA 25(1)
[United Engineers & Constructors, Inc., 100 Summer St., Boston, MA 02110] The present investigation was directed toward describing the trophic habits and factors which affect the distribution of juvenile fishes in a dredged residential canal of a Southwest Florida ocean-front development. The data presented provide a quantitative examination of both the spatial and temporal aspects of the more abundant species. A strong similarity was found between the trophic habits of fishes within the canals and published data for fishes of identical age classes from natural areas.

80-000432 Konchina, Yu. V. SOME DATA ON THE FEEDING OF THE PERUVIAN JACK MACKEREL, /TRACHURUS SYMMETRICUS MURPHYI/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 687-690. 1978. SFA 25(1)
[VNIRO, Moscow, USSR] As regards the nature of the food, the Peruvian jack mackerel is a zoophage. The adult jack mackerel feeds on planktonic crustaceans. As regards the number of species, Copepoda and the larvae of Decapoda are the most diversely represented in the feeding spectrum of the jack mackerel. Euphausiacea, young Stomatopoda and the larvae of Decapoda are the main food items of the Peruvian jack mackerel. Fish occupied a considerable place in the food of large fish 52-58 cm long. The species composition of the food changed by month and in different parts of its range.--Concl.

80-000433 Libey, G. S.; Cole, C. F. FOOD HABITS OF YELLOWTAIL FLOUNDER, /LIMANDA FERRUGINEA/ (STORER). J. Fish Biol. 15 (3): 371-374. Sept. 1979. SFA 25(1)
[Dep. For. Nat. Resour., Purdue Univ., West Lafayette, IN 47907] Yellowtail flounder, /Limanda ferruginea/ were collected from the waters north of Cape Ann, Massachusetts, from April 1971 to January 1972. Cumaceans were the most important food item in the spring. Amphipods and polychaetes, as well as cumaceans, were the main foods consumed in other seasons. Large volumes of plant detritus, sand, and pebbles were present in the stomachs throughout the year. The highest percentage of empty stomachs coincided temporally with the spawning season, although the frequency of occurrence was low at all times. There were no differential food habits by sex or age.

80-000434 Maret, T. R.; Peters, E. J. FOOD HABITS OF THE WHITE CRAPPIE, /POMOXIS ANNULARIS/ RAFINESQUE, IN BRANCHED OAK LAKE, NEBRASKA. Trans. Nebr. Acad. Sci. Affl. Soc. 7: 75-82. 1979. SFA 25(1)
[Dep. For. Fish. Wildl., Univ. Nebr., Lincoln 68583] Food habits of adult white crappie, /Pomoxis annularis/ Rafinesque, in Branched Oak Lake, Lancaster County, Nebraska, were studied by examination of stomach contents from 170 fish. Specimens ranging in size from 194-330 mm were collected by creel census and electrofishing between April 17 and May 5, 1977. Collections were confined to the area along the dam to determine whether crappie prey on newly-hatched walleye larvae. Stomach contents were separated to the lowest feasible taxonomic category, counted, and weighed. Analyses showed that at least 17 taxa were eaten by the crappie. /Hexagenia/ sp. was found to be the most important food item. It occurred in nearly 70 percent of all stomachs containing food and made up 48 percent of the total diet by weight. Fish were found in nearly 32 percent of all stomachs containing food and made up 31 percent of the total diet by weight. However, no larval fish were found. Other important food items consumed were Hirudinea, Chironomidae, Chaoboridae, and Amphipoda.

80-000435 Mathur, D.; Robbins, T. W. FOOD OF THE WHITE CRAPPIE, /POMOXIS ANNULARIS/ RAFINESQUE, IN TWO NEW IMPOUNDMENTS. Proc. Pa. Acad. Sci. 53 (1): 34-36. 1979. SFA 25(1)
[RMC-Muddy Run Ecol. Lab., P.O. Box 10, Drumore, PA 17518] Striking differences in the diet of the white crappie, /Pomoxis annularis/, were noted in two new impoundments in Pennsylvania. In Muddy Run Recreation Lake, the diet progressively changed from planktonic crustaceans to fishes. In the Muddy Run Pumped Storage Pond a feature was extension of the planktonic feeding phase; little fish matter was consumed. Immature forms of insects were only of minor importance on a volumetric basis although they were frequently eaten.

80-000436 Mito, K. [FOOD RELATIONSHIPS IN THE DEMERSAL FISH COMMUNITY IN THE BERING SEA. II. LENGTH COMPOSITIONS OF FISH SPECIES.] Bull. Fac. Fish. Hokkaido Univ. 30 (2): 144-162. May 1979. In Japanese with English summ. SFA 25(1)
[Res. Inst. North Pac. Fish., Fac. Fish., Hokkaido Univ., Hakodate, Japan]

80-000437 Naiman, R. J. PRELIMINARY FOOD STUDIES OF /CYPRINODON MACULARIUS/ AND /CYPRINODON NEVADENSIS/ (CYPRINODONTIDAE). Southwest. Nat. 24 (3): 538-541. 15 Sept. 1979. SFA 25(1)
[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543]

80-000438 Neudecker, S. EFFECTS OF GRAZING AND BROWSING FISHES ON THE ZONATION OF CORALS IN GUAM. Ecology 60 (4): 666-672. Aug. 1979. SFA 25(1)
[Inst. Ecol., Div. Environ. Stud., Univ. Calif., Davis 95616]

80-000439 Pearson, W. D.; Thomas, G. A.; Clark, A. L. EARLY PISCIVORY AND TIMING OF THE CRITICAL PERIOD IN POSTLARVAL LONGNOSE GAR AT MILE 571 OF THE OHIO RIVER. Trans. Ky. Acad. Sci. 40 (3/4): 122-128. Sept. 1979. SFA 25(1)
[Water Resour. Lab., Univ. Louisville, Louisville, KY 40208] Postlarval longnose gar /Lepisosteus osseus/ of 14.1-42.5 mm total length were collected at Ohio River Mile 571 in Trimble County, Kentucky, in May and June of 1977 and 1978. In 1977, only 13.3 percent of those gar with food in their stomachs had consumed other fishes, while cladocerans were the dominant items in the diet. In 1978, however, larval fishes were found in the guts of 84.1 percent of the gar that contained some food. Gar smaller than 20 mm total length contained no food. Apparently, the "critical period" in which postlarval gar must switch over to oxogenous foods ends at a body length of 25 to 26 mm when the fish are estimated to be 18 days old.

80-000440 Powell, A. B.; Schwartz, F. J. FOOD OF /PARALICHTHYS DENTATUS/ AND /P. LETHOSTIGMA/ (PISCES: BOTHIDAE) IN NORTH CAROLINA ESTUARIES. Estuaries 2 (4): 276-279. Dec. 1979. SFA 25(1)
[Beaufort Lab., Southeast Fish. Cent., NMFS, Beaufort, NC 28516] The diets of the spatially segregated summer flounder, /Paralichthys dentatus/, and southern flounder, /P. lethostigma/, in Pamlico Sound, North Carolina, were composed of crustaceans and fishes. Young flounders fed mainly on mysids and fishes throughout the year, but the ratios of these items differed between species. Feeding was minimal during winter, but summer flounder from near-inlet stations had a high frequency of stomachs with food. Older summer flounder fed equally on shrimp and fishes, while southern flounder fed almost solely on fishes. This difference was probably related to food availability.

80-000441 Proskurina, Ye. S. THE FEEDING OF YOUNG FISH IN THE ARAL SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 417-423. 1978. SFA 25(1)
[Aral Dep., Kazakh Fish. Res. Inst., USSR] As a result of alterations in the food supply of the Aral Sea changes have occurred in the feeding of commercial fishes, in particular their changeover to the consumption of introduced organisms (Polychaeta, Mysidaecea) the biomass of which is fairly high (6-11 g/m$^2$).

80-000442 Sagua, V. O. OBSERVATIONS ON THE FOOD AND FEEDING HABITS OF THE AFRICAN ELECTRIC CATFISH /MALAPTERURUS ELECTRICUS/ (GMELIN). J. Fish Biol. 15 (1): 61-69. July 1979. SFA 25(1)

[Agric. Sci. Dep. N.S.T.D.A., Ibadan, Nigeria] The diet and feeding habits of the African electric catfish /Malapterurus electricus/ in their natural habitat in Lake Kainji, and in the River Niger, downstream of Kainji dam, Nigeria, have been described and compared. The study showed the electric catfish is a voracious piscivore. It feeds on cichlids, clupeids, schilbeids and other available fish species. From the size distribution, numbers and composition of the small prey fish species examined in electric catfish stomachs, it was inferred that the powerful high-frequncy electric organ discharge volleys serve as major predatory mechanism.

80-000443 Sirotenko, M. D.; Istomin, A. I. SEASONAL CHANGES IN THE FOOD OF THE "BLACK SEA SCAD", /TRACHURUS MEDITERRANEUS PONTICUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 424-431. 1978. SFA 25(1)

[AzCherNIRO, Kerch, USSR] The feeding intensity and food selectivity of the Black Sea scad, /Trachurus mediterraneus ponticus/, was studied in certain regions of the Black Sea at different times of the day. Maximum feeding intensity occurs in summer, minimum feeding intensity in winter. In spring Copepoda predominate in the food and fish in summer. The nature of the feeding is closely related to the distribution of food organisms.

80-000444 Sosiak, A. J.; Randall, R. G.; McKenzie, J. A. FEEDING BY HATCHERY-REARED AND WILD ATLANTIC SALMON (/SALMO SALAR/) PARR IN STREAMS. J. Fish. Res. Board Can. 36 (11): 1408-1412. Nov. 1979. In English with French summ. SFA 25(1)

[Montreal Engineering Co. Ltd., Environ. Div., 593 King St., Fredericton, NB E3B 1E8, Canada]

80-000445 Strauss, R. E. RELIABILITY ESTIMATES FOR IVLEV'S ELECTIVITY INDEX, THE FORAGE RATIO, AND A PROPOSED LINEAR INDEX OF FOOD SELECTION. Trans. Am. Fish. Soc. 108 (4): 344-352. July 1979. SFA 25(1)

[Grad. Ecol. Prog., Pa. State Univ., University Park 16802]

80-000446 Vinyard, G. AN OSTRACOD (/CYPRIODOPSIS VIDUA/) CAN REDUCE PREDATION FROM FISH BY RESISTING DIGESTION. Am. Midl. Nat. 102 (1): 188-190. July 1979. SFA 25(1)

[Dep. Biol., Univ. Nev., Reno 89557] /Cypriodopsis vidua/, a small ostracod common in temperate North American lakes, has substantial abilities to resist the digestive processes of small bluegill sunfish. Of the ostracods ingested in these experiments, 26 percent traversed the gut of the fish apparently unharmed. Such resistance to digestion constitutes a mechanism of escaping predation and may be relevant in considerations of prey choice by predators. Resistance to digestion could moderate the effects of predation on ostracod populations and could also foster dispersal.

80-000447 Wattendorf, R. J. CANNIBALISM IN ELVERS. Prog. Fish-Cult. 47 (4): 218. Oct. 1979. SFA 25(1)
[Fla. Game Fresh Water Fish Comm., 800 N.W. 40th St., Boca Raton 33431]

80-000448 Weir, D. N. BROWN TROUT AMONG FOOD REMAINS IN A PEREGRINE'S NEST. Bird Study 26 (3): 200. Sept. 1979. SFA 25(1)
[Creagdhu, Newtonmore, Inverness-shire, Scotland]

80-000449 Went, A. E. J. 'FEROX' TROUT, /SALMO TRUTTA/ L. OF LOUGHS MASK AND CORRIB. J. Fish Biol. 15 (3): 255-262. Sept. 1979. SFA 25(1)
[46 Castlepark Rd., Sandycove, Co. Dublin, Ireland] Sets of scales with the relevant information were collected by the Irish Specimen Fish Committee from large or specimen brown trout taken by angling from Loughs Mask, and Corrib. The relationship between lengths and age were determined for those fish for which the necessary information was available. It was concluded that those fish destined to become specimens (10 lb or over in weight) had adopted a fish-eating habit to enable them to maintain a high rate of growth.

## AGE AND GROWTH

80-000450 Abbasov, G. S.; Polyakov, G. D. EVALUATION OF FEEDING CONDITIONS AND THE BIOLOGICAL STATE OF A FISH POPULATION BY MEANS OF THE CONDITION FACTOR. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 404-417. 1978. SFA 25(1)
[Zool. Inst. Azerbaydzhan Acad. Sci., Baku, USSR] using young fish in Azerbaydzhan as an example, it is shown to what extent and under what conditions the condition factor can be used as an indicator of the physiological state. In order that age-induced morphological changes should not influence evaluation of the condition factor, it is proposed to use this factor, calculated not by the usual formula, but on the basis of the "initial size" of the young fish.

80-000451 Barans, C. A.; Stender, B. W.; Nichy, F. OTOLITH REMOVAL FROM MARKETABLE FISH. Prog. Fish-Cult. 47 (4): 212-213. Oct. 1979. SFA 25(1)
[Mar. Resour. Res. Inst., S.C. Wildl. Mar. Resour. Dep., Charleston 29412]

80-000452 Beamish, R. J. NEW INFORMATION ON THE LONGEVITY OF PACIFIC OCEAN PERCH (/SEBASTES ALUTUS/). J. Fish. Res. Board Can. 36 (11): 1395-1400. Nov. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

80-000453 Beitinger, T. L.; Magnuson, J. J. GROWTH RATES AND TEMPERATURE SELECTION OF BLUEGILL, /LEPOMIS MACROCHIRUS/. Trans. Am. Fish. Soc. 108 (4): 378-382. July 1979. SFA 25(1)
[Dep. Biol. Sci., North Tex. State Univ., Denton 76203]

80-000454 Beyer, J. E.; Laurence, G. C. A STOCHASTIC MODEL OF LARVAL FISH GROWTH. Ecol. Model. 8: 109-132. Jan. 1980. SFA 25(1)
[Danish. Inst. Fish. Mar. Res., Charlottenlund Slot, DK-2920, Charlottenlund, Denmark]

80-000455 Brenner, B. C. ULTRASONIC METHOD FOR CLEANING FISH SCALES FOR AGING. Prog. Fish-Cult. 41 (3): 144. July 1979. SFA 25(1)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ,. College Station 77843]

80-000456 Burrough, R. J.; Kennedy, C. R. THE OCCURRENCE AND NATURAL ALLEVIATION OF STUNTING IN A POPULATION OF ROACH, /RUTILUS RUTILUS/ (L.). J. Fish Biol. 15 (1): 93-109. July 1979. SFA 25(1)
[Imperial Coll. Cent. Environ. Technol., 48 Princes Gardens, London SW7 2AZ, England] Two sudden and pronounced changes in the growth rate of raoch, /Rutilus rutilus/ (L.), in Slapton Ley, Devon, have been observed between 1972 and 1976. At first the growth rate declined to the point at which the population became stunted, then subsequently it improved again. These changes were correlated with population density; the numbers of roach were increasing during the late 1960's/early 1970's, and this increase was substantially reinforced by very strong year classes in 1972, and, to a lesser extent, in 1973. The increase in population density resulting from the strong 1972 year class was apparently adequate to accelerate the onset of the stunting observed. The improvement in growth rate in 1976 followed immediately after extensive mortalities amongst the roach during 1975, caused by an epidemic of the parasite /Ligula intestinalis/ (L.). Some improvement in the growth of 0 group roach had been evident during 1975, but this was not observed in the populations. Ford-Walford plots showed a decline in the value of L infinity after the onset of stunting in 1972. Differences in the reproductive biology of the fish were found following the alleviation of stunting; the gonads of both sexes achieved a greater relative weight, and correspondingly the fecundity of the females was higher, although this latter effect became progressively less marked with increasing size. It was not apparent amongst the largest individuals. There was also some evidence of a decline in the proportion of fish maturing at minimum size. The changes in the reproductive biology were associated with the improvement in conditions for individual fish following the decline in population density.

80-000457 Eckmayer, W. J. AGE AND GROWTH OF FOUR SURFPERCHES (EMBIOTOCIDAE) FROM THE OUTER HARBOR OF ANAHEIM BAY, CALIFORNIA. Calif. Fish Game 65 (4): 265-272. Oct. 1979. SFA 25(1)
[Ala. Mar. Resour. Lab., Dauphin Island] Age and growth data were collected and analyzed for four species of surfperches, /Cymatogaster aggregata/, /Embiotoca jacksoni/, /Hyperprosopon argenteum/, and /Phanerodon furcatus/. Standard length to total length, scale radius to standard length, and otolith radius to standard length relationships were constant for all four species, thus allowing for back calculating the ages. Slopes of the length-weight relationship for the four species were all approximately 3.0, indicating isometric growth.

80-000458 Fouda, M. M.; Miller, P. J. ALKALINE PHOSPHATASE ACTIVITY IN THE SKIN OF THE COMMON GOBY, /POMATOSCHISTUS MICROPS/ (KROYER), IN RELATION TO CYCLES IN SCALE AND BODY GROWTH. J. Fish Biol. 15 (3): 263-273. Sept. 1979. SFA 25(1)

[Dep. Zool., Univ. Bristol, Bristol, England] A histochemical study of the distribution of alkaline phosphatase in the skin of the Common goby, /Pomatoschistus microps/, showed that the enzyme is present in the dermis, not in the epithelium, and is more pronounced around the growing edge of the scale and below the fibrillary plate. The intensity of the enzyme reaction is higher in regenerated scales. In conjunction with the phenology of /P. microps/, a method was adopted to measure the enzyme activity in the skin, including scales, for successive months over a period of two years. Enzyme activity displayed seasonal fluctuations which were closely related to both body and scale growth. Enzyme activity also reflected other phenological cycles during the life-span of /P. microps/.

80-000459 Harrison, E. J.; Hadley, W. F. A COMPARISON OF THE USE OF CLEITHRA TO THE USE OF SCALES FOR AGE AND GROWTH STUDIES. Trans. Am. Fish. Soc. 108 (5): 452-456. Sept. 1979. SFA 25(1)

[Dep. Biol. Pesq., Fund. LaSalle, Isla de Margarita, Venequela]

80-000460 Hopkins, C. L. AGE-RELATED GROWTH CHARACTERISTICS OF /GALAXIAS FASCIATUS/ (SALMONIFORMES: GALAXIIDAE). N.Z. J. Mar. Freshwater Res. 13 (1): 39-46. 1979. SFA 25(1)

[Fish. Res. Div., Minist. Agric. Fish., Private Bag, Christchurch, New Zealand] /Galaxias fasciatus/ Gray is one of the diadromous glaxiids whose juveniles are known in New Zealand as whitebait. Its otoliths are shown to have a regular pattern of summer and winter zones that can be used for age determination. Age and annual growth were examined in specimens from the South Island and from the Owhiro Stream, Wellington. A Form of the von Bertalanffy growth equation was used to fit curves to the observed data. Body lengths ranged from 4 cm in juveniles just entering fresh water to nearly 25 cm in the largest adults. Females were found to grow faster and to reach a greater size than males. The oldest fish successfully aged was in its tenth year. About 21 percent of fish from Banks Peninsula exceeded age 5, but only 7 percent from Owhiro Stream were older than this.

80-000461 Jellyman, D. J. SCALE DEVELOPMENT AND AGE DETERMINATION IN NEW ZEALAND FRESHWATER EELS (/ANGUILLA/ SPP.). N.Z. J. Mar. Freshwater Res. 13 (1): 23-30. 1979. SFA 25(1)

[Fish. Res. Div., Minist. Agric. Fish., Private Bag, Christchurch, New Zealand] The appearance and development of scales in /Anguilla australis/ Richardson and /A. dieffenbachii/ Gray were studied to assess the value of scales in age determination. Scales first appear in an area two-thirds along the anus-tail tip distance, when eels are 16-20 cm long. The rate of lateral and longitudinal scale spreading, scale size, and the number of scale rings were all positively related to fish length. The formation of new scale rings showed no seasonal pattern, so these rings cannot be used for age determination. Age could not be determined from length-frequency histograms owing to overlapping of data from adjacent year-classes. However, examination of otoliths prepared by burning showed that the otolith rings were annual in formation, and could be satisfactorily used to calculate age.

80-000462 Linfield, R. S. J. CHANGES IN THE RATE OF GROWTH IN A STUNTED ROACH /RUTILUS RUTILUS/ POPULATION. J. Fish Biol. 15 (3): 275-298. Sept. 1979. SFA 25(1)

[Anglian Water Auth., Diploma House, Grammar School Walk, Huntingdon, Cambs. PE18 6NZ, England] Data is presented concerning the growth of roach in a South Lancashire lake. Results from a sample of roach in May 1969 indicate the slowest growth rate for which published records are available. A comparison of the length/age and weight/age relationships between data for May 1969 and May/June 1971 yields significant between-year differences indicating an increase in the growth rate during that period. A study of the growth history of individual year classes using back-calculated values from operculum measurements suggests that for both sexes the observed increase in the rate of growth commenced after the 1965-67 period during which very weak year classes were produced. The mean length of females appears to have been larger than that of males from the age of four onwards but the 95 percent confidence intervals are almost totally overlapping for each pair of values and a statistical comparison of growth rates between the sexes indicates no significant differences. Data for the sexes combined is compared with published results from other British and Continental waters.

80-000463 Macdonald, P. D. M.; Pitcher, T. J. AGE-GROUPS FROM SIZE-FREQUENCY DATA: A VERSATILE AND EFFICIENT METHOD OF ANALYZING DISTRIBUTION MIXTURES. J. Fish. Res. Board Can. 36 (8): 987-1001. Aug. 1979. In English with French summ. SFA 25(1)

[Dep. Appl. Math., McMaster Univ., Hamilton, ON L8S 4K1, Canada]

80-000464 Methot, R. D., Jr.; Kramer, D. GROWTH OF NORTHERN ANCHOVY, /ENGRAULIS MORDAX/, LARVAE IN THE SEA. NOAA Fish. Bull. 77 (2): 413-423. Apr. 1979. SFA 25(1)

[NMFS, P.O. Box 271, La Jolla, CA 92038]

80-000465 Olatunde, A. A. AGE DETERMINATION, LENGTH-WEIGHT RELATIONSHIP AND GROWTH OF /EUTROPIUS NILOTICUS/ AND /SCHILBE MYSTUS/ IN LAKE KAINJI, NIGERIA. Arch. Hydrobiol. 87 (1): 49-83. 1979. SFA 25(1)

[Sch. Basic Stud., Ahmadu Bello Univ., Zaria, Nigeria] Pectoral spines were found to be satisfactory for age determinations and growth studies of /Eutropius nilotics/ Ruppell and /Schilbe mystus/ Linnaeus (Family Schilbeidae, Osteichthyes: Siluriformes) occurring in Lake Kainji, Nigeria. Transverse sections of the spine showed alternate translucent and opaque bands. Supporting evidences were put forward to show that the narrow opaque bands were true annuli. Annuli were laid down between July and October in /Eutropius niloticus/ and in /Schilbe mystus/ between June and September. Probably causes of annuli formation were investigated. Significant differences (P = 0.1-0.001) were found between the growth rate of males and females. The females grow faster than males of the same age. The females were longer-lived and attained a greater ultimate size. Length-weight relationships data were given. The overall pattern showed that growth of these species was isometric.

80-000466 Sadler, K. EFFECTS OF TEMPERATURE ON THE GROWTH AND SURVIVAL OF THE EUROPEAN EEL, /ANGUILLA ANGUILLA/ L. J. Fish Biol. 15 (4): 499-507. Oct. 1979. SFA 25(1)
[Cent. Elec. Res. Lab, Freshwater Biol. Unit, Ratcliffe-on-Soar Power Stn., Nottingham NG11 0EE, England] Experiments to determine the growth rate of eels (/Anguilla anguilla/ L.) at different temperatures are described and show the optimum temperature for growth to be 22-23°C. The ultimate upper lethal temperature was found to be 38°C and the critical thermal maximum varied from 33 to 39°C for fish acclimated at 14 to 29°C. An attempt was also made to determine lower lethal temperatures. Eels enter a state of torpor at temperatures varying from 3°C for fish acclimated at 29°C to less than 1°C for fish acclimated at 23°C or below. The results have been used to estimate the growth rates expected from eels cultured in power station cooling water using different types of temperature control.

80-000467 Scarnecchia, D. L. VARIATION OF SCALE CHARACTERISTICS OF COHO SALMON WITH SAMPLING LOCATION ON THE BODY. Prog. Fish-Cult. 41 (3): 132-135. July 1979. SFA 25(1)
[Colo. Coop. Fish. Res. Unit, Colo. State Univ., Fort Collins 80523]

80-000468 Smirnov, Yu. A.; Shustov, Yu. A.; Shchurov, I. L. FEATURES OF GROWTH OF YOUNG LAKE SALMON, /SALMO SALAR/ MORPHA /SEBAGO/, IN LAKE ONEGA TRIBUTARIES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 399-403. 1978. SFA 25(1)
[Inst. Biol., USSR Acad. Sci., Karelian Branch, USSR] Differences are found in the growth of the young of /Salmo salar/ morpha /sebago/ in the tributaries of Lake Onega which differ in hydrography, and the hydrologic and hydrobiological regime. In the lake-river type of system, the growth rate of young salmon is significantly higher than in other bodies of water.

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC.

80-000469 Adams, J. A.; Dooley, H. D. FISHES AND THEIR ENVIRONMENT IN THE NORTH SEA. Scott. Fish. Bull. 45: 13-23. 1979. SFA 25(1)

80-000470 Anderson, M. E.; Cailliet, G. M.; Antrim, B. S. NOTES ON SOME UNCOMMON DEEP-SEA FISHES FROM THE MONTEREY BAY AREA, CALIFORNIA. Calif. Fish Game 65 (4): 256-264. Oct. 1979. SFA 25(1)
[Va. Inst. Mar. Sci., Gloucester Point 23062]

80-000471 Banister, K. E.; Bailey, R. G. FISHES COLLECTED BY THE ZAIRE RIVER EXPEDITION, 1974-75. Zool. J. Linn. Soc. 66 (3): 205-249. July 1979. SFA 25(1)
[Dep. Zool., Brit. Mus. (Nat. Hist.), Cromwell Rd., London SW7, England] An annotated list of the fishes collected by the Zaire River Expedition, October 1974-January 1975, is presented, and five new species are described. The majority of the collections came from the River Lualaba and associated water bodies and provide new information on the distribution of the ichthyofauna in the Zaire basin. A re-examination of the available geomorphological and zoogeographical evidence failed to substantiate the hypothesis that the upper Lualaba was formerly a tributary of the Nile.

80-000472 Borroni, I.; Grimaldi, E. PRESENZA DI /BLENNIUS FLUVIATILIS/ (PISCES: BLENNIIDAE) NEL LAGO MAGGIORE. [THE PRESENCE OF THE FRESHWATER BLENNY /BLENNINUS FLUVIALITIS/ ASSO IN LAGO MAGGIORE (NORTHERN ITALY) IS ASCERTAINED FOR THE FIRST TIME.] Mem. Ist. Ital. Idrobiol. Dott. Marco de Marchi 36: 303-308. 1978. SFA 25(1)

80-000473 Bryant, R. T.; Beets, J. P.; Ryon, M. G. REDISCOVERY OF THE SHARPHEAD DARTER, /ETHEOSTOMA ACUTICEPS/, IN NORTH CAROLINA (PISCES: PERCIDAE). Brimleyana No. 2. p. 137-140. Nov. 1979. SFA 25(1)
[Grad. Prog. Ecol., Univ. Tenn., Knoxville 37916]

80-000474 Burr, B. M.; Cashner, R. C.; Pflieger, W. L. /CAMPOSTOMA OLIGOLEPIS/ AND /NOTROPIS OZARCANUS/ (PISCES: CYPRINIDAE), TWO ADDITIONS TO THE KNOWN FISH FAUNA OF THE ILLINOIS RIVER, ARKANSAS AND OKLAHOMA. Southwest. Nat. 24 (2): 381-383. 31 July 1979. SFA 25(1)
[Dep. Zool., South. Ill. Univ., Carbondale 62901]

80-000475 Cook, K. D. FISH POPULATION STUDY OF WEST CACHE CREEK WITH EMPHASIS ON SEARCH FOR THE WICHITA SPOTTED BASS, /MICROPTERUS PUNCTULATUS WICHITAE/. Proc. Okla. Acad. Sci. 59: 1-3. 1979. SFA 25(1)
[Okla. Dep. Wildl. Conserv., Star Route, Box 66E, Lawton 73501] This study was initiated to determine the status of the Wichita spotted bass, /Micropterus punctulatus wichitae/, last collected in West Cache Creek, Oklahoma in 1928. West Cache Creek on the Wichita Mountains National Wildlife Refuge was sampled with seines, electrofishing, rotenone, and hook and line in an attempt to collect specimens of the Wichita spotted bass. A total of 98 bass were collected, none of which were identified as the target subspecies. It was determined that the Wichita spotted bass is probably no longer present in the area. Other species collected are listed.

80-000476 Courtenay, W. R., Jr.; Hensley, D. A. RANGE EXPANSION IN SOUTHERN FLORIDA OF THE INTRODUCED SPOTTED TILAPIA, WITH COMMENTS ON ITS ENVIRONMENTAL IMPRESS. Environ. Conserv. 6 (2): 149-151. 1979. SFA 25(1)
[Dep. Biol. Sci., Fla. Atl. Univ., Boca Raton 33431] The Spotted Tilapia, /Tilapia mariae/, apparently introduced to Dade County, Florida, between 1972 and 1974, has expanded its range dramatically. This exotic fish is now established in three counties (Broward, Collier, and Dade) in canals and lakes in an area encompassing approximately 2,000 km$^2$. Field observations and collections indicate that the Spotted Tilapia is common and sometimes a dominant (in excess of 50 percent of the total fish-biomass) species in canals of eastern Dade County. There have been apparent decreases in populations of native and some exotic fishes in these same waters that were probably attributable to direct competition and population increases by this aggressive cichlid fish. /Tilapia mariae/ also appears to be established in southern Arizona.

80-000477 Francis, L. J.; Bjornn, T. C. AQUATIC RESOURCES IN THE NATURE CONSERVANCY PORTION OF SILVER CREEK. Univ. Idaho For. Wildl. Range Exp. Stn. Tech. Rep. 9. v + 84p. June 1979. SFA 25(1)
[Idaho Coop. Fish. Res. Unit, Univ. Idaho, Moscow 83843]

80-000478 Froiland, O. FISH TYPES IN THE ZOOLOGICAL MUSEUM, UNIVERSITY OF BERGEN, NORWAY. Sarsia 64 (3): 143-154. 1979. SFA 25(1)
[Fiskerimuseet, Nordahl Bruns gt. N-5000 Bergen, Norway]

80-000479 Fursa, T. I.; Movchan, Yu. V. THE FISH FAUNA OF THE SOUTHWEST COAST OF INDIA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 351-362. 1978. SFA 25(1)
[AzCherNIRO, Kerch, USSR]

80-000480 Goren, M. THE GOBIINAE OF THE RED SEA (PISCES: GOBIIDAE). Senckenb. Biol. 60 (1/2): 13-64. 15 Aug. 1979. SFA 25(1)
[Dep. Zool., Tel-Aviv Univ., 155 Herzl St., Tel-Aviv, Israel]

80-000481 Hendricks, M. L.; Stauffer, J. R., Jr.; Hocutt, C. H.; Gilbert, C. R. A PRELIMINARY CHECKLIST OF THE FISHES OF THE YOUGHIOGHENY RIVER. Nat. Hist. Misc. (Chic.) No. 203. 15p. 1 Feb. 1979. SFA 25(1)
[Appalachian Environ. Lab., Univ. Md., Frostburg 21532]

80-000482 Kalinina, E. M.; Podosinnikov, A. Yu. QUALITATIVE COMPOSITION AND SEASONAL CHANGES IN THE CANARY CURRENT ICHTHYOPLANKTON. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 495-500. 1978. SFA 25(1)
[Inst. Biol. South. Seas, Ukrainian SSR Acad. Sci., Sevastopol, USSR]

80-000483 Lindquist, D. G. ECUADORIAN RECORD FOR THE KYPHOSID FISH, /SECTATOR OCYURUS/. J. Elisha Mitchell Sci. Soc. 94 (1): 30-31. 1978. SFA 25(1)
[Dep. Biol., Univ. N.C., Wilmington 28406]

80-000484 Lopes, P. do C. EGGS AND LARVAE OF /MAUROLICUS MUELLERI/ (GONOSTOMATIDAE) AND OTHER FISH EGGS AND LARVAE FROM TWO FJORDS IN WESTERN NORWAY. Sarsia 64 (3): 199-210. 1979. SFA 25(1)
[Inst. Nac. Invest. Pescas, Alges-Praia, Lisbon 3, Portugal] The distribution and abundance of eggs and larvae of /Maurolicus muelleri/ (Gmelin, 1788) in Masfjorden and Fensfjorden were investigated from April to September 1977, by means of the Bongo net 20. For each cruise the total number of /M. muelleri/ eggs present in the spawning area was estimated and the total number of eggs spawned during this preiod was 9 X $10^{10}$ in Masfjorden and 58 X $10^{9}$ in Fensfjorden. The estimated stock sizes were 6400 and 30,700 tons for Masfjorden and Fensfjorden respectively. Studies of fish eggs and larvae showed that 35 species were present in both fjords. Eggs of /Brosme brosme/, /Microstomus kitt/, /Gaidropsarus/ sp., and /Ctenolabrus rupestris/ and larvae of /Sebastes/ sp. and /Benthosema glaciale/ were particularly abundant.

80-000485 Luling, K. H. WISSENSCHAFTLICHE ERGEBNISSE DER BRASILIEN-PERU EXPEDITION DR. K. H. LULING 1974. WEITERE UNTERSUCHUNGEN AM RIO MAGE-RONCADOR UND SEINEN CHARAKTERISTICHEN FISCHEN VOR DER EINMUENDUNG IN DIE BUCHT VON RIO DE JANEIRO (SUEDOSTBRASILIEN). [SCIENTIFIC RESULTS OF THE BRASIL-PERU EXPEDITION DR. K. H. LULING 1974. FURTHER INVESTIGATIONS OF THE RIO RONCADOR AND ITS CHARACTERISTIC FISHES NEAR THE BAY OF RIO DE JANEIRO (SOUTHEASTERN BRAZIL).] Zool. Anz. 203 (1/2): 99-113. 1979. In German with English summ. SFA 25(1)
[Ichthyol. Abt. Zool. Forschungsinst. Mus. Alexander Koenig, Bonn, West Germany]

80-000486 McDonald, E. F., Jr.; Pflieger, W. L. THE SPRING CAVEFISH, /CHOLOGASTER AGASSIZI/ (PISCES: AMBLYOPSIDAE), IN SOUTHEASTERN MISSOURI. Am. Midl. Nat. 102 (1): 194-196. July 1979. SFA 25(1)
[Rt. 1, Box 468, Cape Girardeau, MO 63701] A population of /Chologaster agassizi/, representing the first known occurrence of the species W of the Mississippi River, is reported from the Benton Hills of southeastern Missouri. This population may have been established prior to diversion of the Mississippi River into its present course S of Cape Girardeau, when the Benton Hills were continuous with the Shawnee Hills of southern Illinois. If this supposition is correct, the Missouri population of /Chologaster agassizi/ may have been isolated from Illinois populations for 2000 years or more.

80-000487 McNatt, R. DISCOVERY AND LOSS OF A NEW LOCALITY FOR THE GILA TOPMINNOW, /POECILIOPSIS OCCIDENTALIS OCCIDENTALIS/ (POECILIIDAE). Southwest. Nat. 24 (3): 555-556. 15 Sept. 1979. SFA 25(1)
[U.S. FWS, P.O. Box 1306, Albuquerque, NM 87103]

80-000488 Mikol, G. F.; Hadley, W. F. EVIDENCE OF A SUCCESSFUL REPRODUCTION OF COHO SALMON IN A NEW YORK TRIBUTARY OF LAKE ERIE. N.Y. Fish Game J. 26 (1): 97-98. Jan. 1979. SFA 25(1)
[N.Y. Dep. Environ. Conserv., Ray Brook 12977]

80-000489 Modde, T. C. CHARACTERIZATION OF THE ICHTHYOFAUNA OCCUPYING THE SURF ZONE OF A NORTHERN GULF COAST BARRIER ISLAND. Ph.D. dissertation, Univ. South. Miss. 183p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(3):1045. Sept. 1979. SFA 25(1)

80-000490 Paulin, C. D.; Moreland, J. M. HALOSAURIDAE OF THE SOUTH-WEST PACIFIC (PISCES: TELEOSTEI: NOTACANTHIFORMES). N.Z. J. Zool. 6 (2): 267-271. June 1979. SFA 25(1)
[Natl. Mus. N.Z., Private Bag, Wellington, New Zealand]

80-000491 Pigg, J.; Barnett, M.; Scott, K. RECENT RECORDS OF THE YELLOW BASS, /MORONE MISSISSIPPIENSIS/ JORDAN AND EIGEMANN, IN OKLAHOMA. Proc. Okla. Acad. Sci. 59: 123. 1979. SFA 25(1)
[Moore High Sch. Sci. Dep., Moore, OK 73160]

80-000492 Reider, R. H. OCCURRENCE OF THE SILVER LAMPREY IN THE HUDSON RIVER. N.Y. Fish Game J. 26 (1): 93. Jan. 1979. SFA 25(1)
[Detroit Edison Co., 2000 Second Ave., Detroit, MI 48226]

80-000493 Reider, R. H. OCCURRENCE OF A KOKANEE IN THE HUDSON RIVER. N.Y. Fish Game J. 26 (1): 94. Jan. 1979. SFA 25(1)
[Detroit Edison Co., 2000 Second Ave., Detroit, MI 48226]

80-000494 Reigh, R. C.; Elsen, D. S. STATUS OF THE STURGEON CHUB (/HYBOPSIS GELIDA/) AND SICKLEFIN CHUB (/HYBOPSIS MEEKI/) IN NORTH DAKOTA. Prairie Nat. 11 (2): 49-52. June 1979. SFA 25(1)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

80-000495 Rohde, F. C.; Burgess, G. H.; Link, G. W., Jr. FRESHWATER FISHES OF CROATAN NATIONAL FOREST, NORTH CAROLINA, WITH COMMENTS ON THE ZOOGEOGRAPHY OF COASTAL PLAIN FISHES. Brimleyana No. 2. p. 97-118. Nov. 1979. SFA 25(1)
[Dep. Zool., Univ. N.C., Chapel Hill 27514]

80-000496 Sazonov, Yu. I. /ROULEINA SQUAMILATERA/ (SALMONIFORMES, ALEPOCEPHALIDAE) FROM THE BATHYAL ZONE OF THE OKHOTSK SEA NEW TO THE FAUNA OF THE USSR. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 670-672. 1978. SFA 25(1)
Inst. Oceanol., IOAN, Moscow, USSR]

80-000497 Shust, K. V. ON THE DISTRIBUTION AND BIOLOGY OF MEMBERS OF THE GENUS /MICROMESISTIUS/ (FAMILY GADIDAE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 490-493. 1978. SFA 25(1)
[VNIRO, Moscow, USSR]

80-000498 Svetlov, M. F. CAPTURE OF A SPECIMEN OF /XENOCYTTUS NEMOTOI/ ABE IN THE SOUTH-EASTERN PART OF THE PACIFIC OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 493-494. 1978. SFA 25(1)
[VNIRO, Moscow, USSR]

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY

80-000499 Albin, D. P. FIRE AND STREAM ECOLOGY IN SOME YELLOWSTONE LAKE TRIBUTARIES. Calif. Fish Game 65 (4): 216-238. Oct. 1979. SFA 25(1)
[Calif. State Water Resour. Bd., P.O. Box 100, Sacramento 95801]
This study attempted to clarify some effects of forest fires on streams in selected tributaries to Yellowstone Lake, Yellowstone National Park, in partial evaluation of the Park's natural burn fire management policy. In a stream in a watershed burned 45 and 36 years ago (Passage Creek) some changes were found, when compared to a similar stream in an unburned adjacent watershed (Chipmunk Creek). Summer stream temperatures averaged about 1.5 C higher in Passage Creek. Streamflow showed a greater seasonal fluctuation and a higher water yield in Passage Creek. Water quality conditions in both streams were similar, but mineral export was greater in Passage Creek due to greater water yield. Aufwuchs accumulation on artificial substrates showed no significant difference between the two streams. Benthic

80-000499 CONTINUED
sampling suggested a general increase in benthic macroinvertebrates in Passage Creek. The fry of Yellowstone cutthroat trout, /Salmo clarki lewisi/, appeared to emerge from the gravel earlier in Passage Creek than in Chipmunk Creek. Based on stream temperature differences, the difference in egg incubation time was calculated to be 4 days. Two other streams were studied during and immediately after a fire burned their watersheds (Streams 173 and 174). No harmful effects were found. Concentrations of calcium, magnesium, potassium, chloride, sulfate, phosphate, and total organic carbon were raised somewhat during a rainstorm, apparently as a result of ash leached into surface runoff.

80-000500 Davis, J. R. DIE-OFFS OF AN ENDANGERED PUPFISH, /CYPRINODON ELEGANS/ (CYPRINODONTIDAE). Southwest. Nat. 24 (3): 534-536. 15 Sept. 1979. SFA 25(1)
[Tex. dep. Water Resour., Water Qual. Assessment Unit, P.O. Box 13087, Capitol Station, Austin 78711]

80-000501 Kushnarenko, A. I.; Sibirtsev, G. G. FEATURES OF THE DISTRIBUTION AND ABUNDANCE OF THE CASPIAN ROACH, /RUTILUS RUTILUS CASPICUS/, THE BREAM, /ABRAMIS BRAMA/, AND THE PIKE-PERCH, /LUCIOPERCA LUCIOPERCA/, IN THE NORTHERN CASPIAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 377-385. 1978. SFA 25(1)
[KaspNIRKh, Astrakhan, USSR] Data are given on the distribution of semi-diadromous fish in relation to depths and salinity. The relative abundance of these fish and the area of their distribution in recent years are shown. Reasons for the fluctuation in abundance are examined.

80-000502 Kynard, B. E. POPULATION DECLINE AND CHANGE IN FREQUENCIES OF LATERAL PLATES IN THREESPINE STICKLEBACKS (/GASTEROSTEUS ACULEATUS/). Copeia 1979 (4): 635-638. 28 Nov. 1979. SFA 25(1)
[Mass. Coop. Fish. Res. Unit, Univ. Mass., Amherst 01003]

80-000503 Matthews, W. J.; Maness, J. D. CRITICAL THERMAL MAXIMA, OXYGEN TOLERANCES AND SUCCESS OF CYPRINID FISHES IN A SOUTHWESTERN RIVER. Am. Midl. Nat. 102 (2): 374-377. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Okla., Norman 73019] Critical thermal maxima (CTMs) and tolerances to low oxygen conditions were determined for /Notropis atherinoides/ (emerald shiner), /N. girardi/ (Arkansas River shiner), /N. lutrensis/ (red shiner) and /Hybognathus placitus/ (plains minnow) from the South Canadian River near Norman, Oklahoma. Field studies during the previous year had indicated marked differences in success of the four species during drought, when temperature or oxygen conditions could have had a major impact on their survival. The CTMs of /N. lutrensis/ and /H. placitus/ were higher than those of /N. girardi/ and /N. atherinoides/, while /H. placitus/ and /N. girardi/ were more tolerant of low oxygen conditions than were /N. lutrensis/ or /N. atherinoides/. Field success of the species was more closely related to CTMs than to oxygen tolerances: /N. lutrensis/ and /H. placitus/ populations increased more from May to October than did the other two species. This study is the first to demonstrate a relationship between comparative CTMs and fluctuations of fish populations in the field.

80-000504 Toneys, M. L.; Coble, D. W. SIZE-RELATED, FIRST WINTER MORTALITY OF FRESHWATER FISHES. Trans. Am. Fish. Soc. 108 (4): 415-419. July 1979. SFA 25(1)
[Ichthyological Assoc., Inc., 100 S. Cass St., Middletown, DE 19709]

IDENTIFICATION, KEYS, CLASSIFICATION

80-000505 Andriyashev, A. P. /TREMATOMUS TOKAREVI/, A NEW SPECIES OF THE FAMILY NOTOTHENIIDAE (PISCES) FROM THE ABYSSAL WATERS NEAR ANTARCTICA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (4): 521-526. 1978. SFA 25(1)
[Zool. Inst., USSR Acad. Sci., Leningrad, USSR]

80-000506 Berman, D. S. /GNATHORHIZA BOTHROTRETA/ (OSTEICHTHYES: DIPNOI) FROM THE LOWER PERMIAN ABO FORMATION OF NEW MEXICO. Ann. Carnegie Mus. 48 (13): 211-230. 7 Sept. 1979. SFA 25(1)
Carnegie Mus. Nat. Hist., 4400 Forbes Ave., Pittsburg, PA 15213]

80-000507 Colin, P. L.; Arneson, D. W.; Smith-Vaniz, W. F. REDISCOVERY AND REDESCRIPTION OF THE CARIBBEAN ANOMALOPID FISH /KRYPTOPHANARON ALFREDI/ SILVESTER AND FOWLER (PISCES: ANOMALOPIDAE). Bull. Mar. Sci. 29 (3): 312-319. July 1979. SFA 25(1)
[Dep. Mar. Sci., Univ. Puerto Rico, Mayaquez 00708]

80-000508 Dawson, C. E. THE INDO-PACIFIC PIPEFISH GENERA /NOTIOCAMPUS/ GEN. NOV. AND /NANNOCAMPUS/ GUNTHER. Proc. Biol. Soc. Wash. 92 (3): 482-493. 18 Oct. 1979. SFA 25(1)
[Gulf Coast Res. Lab. Mus., Oceans Springs, MS 39564]

80-000509 Dawson, C. E. NOTES ON WESTERN ATLANTIC PIPEFISHES WITH DESCRIPTION OF /SYNGNATHUS CARIBBAEUS/ N. SP. AND /COSMOCAMPUS/ N. GEN. Proc. Biol. Soc. Wash. 92 (4): 671-676. 16 Nov. 1979. SFA 25(1)
[Gulf Coast Res. Lab. Mus., Ocean Springs, MS 39564]

80-000510 Fink, W. L. /HILDATIA/ FERNANDEZ-YEPEZ, A SYNONYM OF THE GYMNOTOID GENUS /STERNOPYGUS/ MULLER AND TROSCHEL. Copeia 1979 (4): 751-752. 28 Nov. 1979. SFA 25(1)
[Mus. Comp. Zool., Harvard Univ., Cambridge, MA 02138]

80-000511 Fourmanoir, P.; Randall, J. E. THREE NEW SPECIES OF SERRANID FISHES OF THE GENUS /PLECTRANTHIAS/ FROM NEW CALEDONIA. Micronesica 15 (1/2): 315-324. June 1979. SFA 25(1)
[ORSTOM, B.P. A5, Noumea, New Caledonia]

80-000512 Gomon, M. F. A REVISION OF THE LABRID FISH GENUS /BODIANUS/, WITH AN ANALYSIS OF THE RELATIONSHIPS OF OTHER MEMBERS OF THE TRIBE HYPSIGENYINI. Ph.D. dissertation, Univ. Miami 679p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(4):1578. Oct. 1979. SFA 25(1)

80-000513 Greenwood, P. H. TOWARDS A PHYLETIC CLASSIFICATION OF THE 'GENUS' /HAPLOCHROMIS/ (PISCES, CICHLIDAE) AND RELATED TAXA. PART I. Bull. Br. Mus. (Nat. Hist.) Zool. 35 (4): 265-322. 31 May 1979. SFA 25(1)
[Dep. Zool., Brit. Mus. (Nat. Hist.), Cromwell Rd., London SW7 5BD, England]

80-000514 Hickman, T. J.; Behnke, R. J. PROBABLE DISCOVERY OF THE ORIGINAL PYRAMID LAKE CUTTHROAT TROUT. Prog. Fish-Cult. 41 (3): 135-137. July 1979. SFA 25(1)
[Dep. Fish. Wildl. Biol., Colo. State Univ., Fort Collins 80523]

80-000515 Iwamoto, T. EASTERN PACIFIC MACROURINE GRENADIERS WITH SEVEN BRANCIOSTEGAL RAYS (PISCES: MACROURIDAE). Proc. Calif. Acad. Sci. 42 (5): 135-179. 22 Dec. 1979. SFA 25(1)
[Dep. Ichthyol., Calif. Acad. Sci., Golden Gate Park, San Francisco 94118]

80-000516 Klar, G. T.; Stalnaker, C. B. ELECTROPHORETIC VARIATION IN MUSCLE LACTATE DEHYDROGENASE IN SNAKE VALLEY CUTTHROAT TROUT, /SALMO CLARKI/ SUBSP. Comp. Biochem. Physiol. B Comp. Biochem. 64 (4): 391-394. 1979. SFA 25(1)
[Paint Bank Natl. Fish Hatchery, Rt. 1, Box 12, Paint Bank, VA 24131] Electrophoretic variation observed in muscle A group lactate dehydrogenase in Snake Valley cutthroat trout (/Salmo clarki/ supsp.) suggested the presence of two variant alleles at the $A^1$ locus and a null allele at the $A^2$ locus. The taxonomic status of the Snake Valley cutthroat trout was reviewed.

80-000517 Lugaski, T. /GILA TRAINI/, A NEW PLIOCENE CYPRINID FISH FROM JERSEY VALLEY, NEVADA. J. Paleontol. 53 (5): 1160-1164. Sept. 1979. SFA 25(1)
[P.O. Box 323, Steamboat, NV 89436]

80-000518 McDowall, R. M. THE CENTROLOPHID GENUS /TUBBIA/ (PISCES: STROMATEOIDEI). Copeia 1979 (4): 733-738. 28 Nov. 1979. SFA 25(1)
[Fish. Res. Div., Minist. Agric. Fish., Private Bag, Christchurch, New Zealand]

80-000519 Miller, P. J.; Wongrat, P. A NEW GOBY (TELEOSTEI: GOBIIDAE) FROM THE SOUTH CHINA SEA AND ITS SIGNIFICANCE FOR GOBIOID CLASSIFICATION. Zool. J. Linn. Soc. 67 (3): 239-257. Nov. 1979. SFA 25(1)
[Zool. Dep., Univ. Bristol, Bristol BS8 1UG, England]

80-000520 Nelson, J. S. /BEMBROPS MORELANDI/, A NEW PERCOPHIDID FISH FROM NEW ZEALAND, WITH NOTES ON OTHER MEMBERS OF THE GENUS. Natl. Mus. N.Z. Rec. 1 (14): 237-241. Oct. 1978. SFA 25(1)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9 Canada]

80-000521 Nybelin, O. CONTRIBUTIONS TO TAXONOMY AND MORPHOLOGY OF THE GENUS /ELOPS/ (PISCES, TELEOSTEI). Acta Regiae Soc. Sci. Lit. Gothoburg. Zool. 12. 37p. 12 Mar. 1979. SFA 25(1)
[Natl. Hist. Mus., Goteborg, Sweden]

80-000522 Smith, D. G. GUIDE TO THE LEPTOCEPHALI (ELOPIFORMES, ANGUILLIFORMES, AND NOTACANTHIFORMES). NOAA Tech. Rep. NMFS Circ. 424. iv + 39p. July 1979. SFA 25(1)
[Mar. Biomed. Inst., Univ. Tex. Med. Br., 200 University Blvd., Galveston 77550]

80-000523 Smith, M. M. /RHABDOSARGUS THORPEI/, A NEW SPARID FISH FROM SOUTH AFRICA, WITH A KEY TO THE SPECIES OF /RHABDOSARGUS/. Copeia 1979 (4): 702-709. 28 Nov. 1979. SFA 25(1)
[Inst. Ichthyol., Rhodes Univ., Grahamstown 6140, Republic of South Africa]

80-000524 Winterbottom, R. A NEW GENUS AND SPECIES OF THE FAMILY CONGROGADIDAE (PISCES: PERCIFORMES) FROM THE WESTERN INDIAN OCEAN. Bull. Mar. Sci. 29 (3): 298-302. July 1979. SFA 25(1)
[Dep. Ichthyol. Herpetol., Royal Ontario Mus., 100 Queen's Park, Toronto, ON M5S 2C6, Canada]

PARASITES AND DISEASES-GENERAL

80-000525 Andrews, C. HOST SPECIFICITY OF THE PARASITE FAUNA OF PERCH /PERCA FLUVIATILIS/ L. FROM THE BRITISH ISLES, WITH SPECIAL REFERENCE TO A STUDY AT LLYN TEGID (WALES). J. Fish Biol. 15 (2): 195-209. Aug. 1979. SFA 25(1)
[Yorkshire Water Auth. (Sci. Serv.), Olympia House, Gelderd Rd., Leeds LS12 6DD, England] Five-hundred and fifty-nine perch (/Perca fluviatilis/ L.) were examined from Llyn Tegid between January 1975-July 1976 for protozoan and metazoan parasites. Sixteen species of parasites were recorded, and these results were compared to previous studies at Llyn Tegid, and elsewhere in the British Isles. It was concluded that the parasite fauna of perch is influenced by the diversity and abundance of the local aquatic invertebrate fauna, the local ichthyofauna, the local piscivorous avian fauna and the history and geographic isolation of the environment. The importance of a large series of observations on a variety of habitats was stressed.

80-000526 Appy, R. G. PARASITES OF COD, /GADUS MORHUA/ L. IN THE NORTHWESTERN ATLANTIC OCEAN. Ph.D. dissertation, Univ. New Brunswick 1979. From Diss. Abstr. Int. B Sci. Eng. 40(5):2004. Nov. 1979. SFA 25(1)

80-000527 Curtis, M. A. METAZOAN PARASITES OF RESIDENT ARCTIC CHAR (/SALVELINUS ALPINUS/) FROM A SMALL LAKE ON SOUTHERN BAFFIN ISLAND. Nat. Can. (Que.) 106 (2): 337-338. Mar.-Apr. 1979. SFA 25(1)
[Inst. Parasitol., McGill Univ., Macdonald Coll., Sainte-Anne-de-Bellevue, PQ H9X 1C0, Canada]

80-000528 Hoskins, G. E.; Kieser, D.; Nash, F. COMPUTER MANAGEMENT OF FISH HEALTH DATA. Prog. Fish-Cult. 47 (4): 176-180. Oct. 1979. SFA 25(1)
[Dep. Fish. Oceans, Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

80-000529 Lian, C. G.; Seng, L. T. PARASITES OF FISHES FROM SUNGAI PINANG AND SUNGAI TELUK BAHANG, PULAU PINANG, MALAYSIA. Malay. Nat. J. 32 (3/4): 247-251. June 1979. SFA 25(1)
[Sch. Biol. Sci., Univ. Sains, Malaysia]

80-000530 Margolis, L.; Arthur, J. R. SYNOPSIS OF THE PARASITES OF FISHES OF CANADA. Bull. Fish. Res. Board Can. 199. vi + 269p. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

80-000531 Sherburne, S. W.; Bean, L. L. INCIDENCE AND DISTRIBUTION OF PISCINE ERYTHROCYTIC NECROSIS AND THE MICROSPORIDIAN, /GLUGEA HERTWIGI/, IN RAINBOW SMELT, /OSMERUS MORDAX/, FROM MASSACHUSETTS TO THE CANADIAN MARITIMES. NOAA Fish. Bull. 77 (2): 503-509. Apr. 1979. SFA 25(1)
[Me. Dep. Mar. Resour., Fish. Res. Stn., West Boothbay Harbor 04575]

80-000532 Strasdine, G. A.; McBride, J. R. SERUM ANTIBIOTIC LEVELS IN ADULT SOCKEYE SALMON AS A FUNCTION OF ROUTE OF ADMINISTRATION. J. Fish Biol. 15 (1): 135-140. July 1979. SFA 25(1)
[B. C. Research, 3650 Wesbrook Crescent, Vancouver, BC, Canada]
Adult sockeye salmon, /Oncorhynchus nerka/ (Walbaum), in three different stages of sexual maturity were administered the antibiotic, oxytetracycline, by injection (intraperitoneal and intramuscular), water bath exposure and stomach capsule implant. Concentrations of the antibiotic in, and its disappearance from the serum were determined. For all three stages of sexual maturity the most efficacious route of administration based on maximum titre and duration in the serum was provided by intraperitonial injection. Intramuscular application produced a positive effect, albeit at a markedly lower level, in all three groups of fish. Oral implants resulted in only a minor uptake of the antibiotic in the fully ripe fish. Immersion of the fish in water solutions of oxytetracycline was without effect.

BACTERIAL DISEASES

80-000533 Anderson, D. P.; Roberson, B. S.; Dixon, O. W. INDUCTION OF ANTIBODY-PRODUCING CELLS IN RAINBOW TROUT, /SALMO GAIRDNERI/ RICHARDSON; BY FLUSH EXPOSURE. J. Fish Biol. 15 (3): 317-322. Sept. 1979. SFA 25(1)
[U.S. FWS, Natl Fish Health Res. Lab., Rt. 3, Box 50, Kearneysville, WV 25430] Splenic antibody-producing cells were produced by rainbow trout that had been exposed to O-antigens extracted from /Yersinia ruckeri/ and /Aeromonas salmonicida/ by adding the concentrated antigen preparation directly into the water of the tank holding the fish for flush exposure. This method was compared with the proven techniques of exposure: intraperitoneal injection or a 2 minute immersion of the fish in the antigen preparation. Dosage experiments showed that the production of antibody-producing cells was induced by the immersion of trout for 2 minutes in water with 5.0 ug $ml^{-1}$ (or more) with the /Y. ruckeri/ O-antigen, or 500 ug $ml^{-1}$ (or more) of the /A. salmonicida/ O-antigen. Similar differences were evident when the respective antigens were added directly to the water.

80-000534 Barham, W. T.; Schoonbee, H.; Smit, G. L. THE OCCURRENCE OF AEROMONAS AND STREPTOCOCCUS IN RAINBOW TROUT, /SALMO GAIRDNERI/ RICHARDSON. J. Fish Biol. 15 (4): 457-460. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Zululand, Private Bag Kwa-Dlangezwa 3886, Republic of South Africa]

80-000535 Ghittino, P.; Andruetto, S. FISH VIBRIOSIS IN FRESH AND SALT WATERS IN ITALY. Riv. It. Piscic. Ittiop. 14 (2): 55-56. Apr.-May-June 1979. In English and Italian. SFA 25(1)
[Ist. Zooprof. Sper., Via Bologna, 148, 10154 Torino, Italy]

80-000536 Hawke, J. P. A BACTERIUM ASSOCIATED WITH DISEASE OF POND CULTURED CHANNEL CATFISH, /ICTALURUS PUNCTATUS/. J. Fish. Res. Board Can. 36 (12): 1508-1512. Dec. 1979. In English with French summ. SFA 25(1)
[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830]

80-000537 Horiuchi, M.; Kohga, K. RAPID DIAGNOSIS OF RED SPOT DISEASE IN CULTURED EELS BY DIRECT IMMUNOFLUORESCENCE (IF). Bull. Jpn. Soc. Sci. Fish. 45 (7): 835-840. July 1979. In Japanese with English summ. SFA 25(1)
[Nihon Nosan Kagyo Co., Ltd., Res. Cent., Midori-ku, Yokohama 226, Japan]

80-000538 Larsen, J. L.; Jensen, N. J. THE ULCUS-SYNDROME IN COD (/GADUS MORHUA/). II. A BACTERIOLOGICAL INVESTIGATION. Nord. Veterinaermed. 31 (7/8): 289-296. July-Aug. 1979. In English with Danish summ. SFA 25(1)
[Inst. Vet. Microbiol. Hygiene, R. Vet. Agric. Univ., Copenhagen, Denmark] The ulcus-syndrome in cod was shown not to be an ethiological entity in a bacteriological sense as different bacterial species were found implicated. Primary Skin alterations give access for bacterial invasion resulting in the development of ulcers and septicaemia.

80-000539 Mitchum, D. L.; Sherman, L. E.; Baxter, G. T. BACTERIAL KIDNEY DISEASE IN FERAL POPULATIONS OF BROOK TROUT (/SALVELINUS FONTINALIS/), BROWN TROUT (/SALMO TRUTTA/), AND RAINBOW TROUT (/SALMO GAIRDNERI/). J. Fish. Res. Board Can. 36 (11): 1370-1376. Nov. 1979. In English with French summ. SFA 25(1)
[Res. Lab., Wyo. Game Fish Dep., University Stn., Laramie 82071]

80-000540 Muroga, K.; Takahashi, S.; Yamanoi, H.; Nisnibuchi, M. NON-CHOLERA VIBRIO ISOLATED FROM DISEASED AYU. Bull. Jpn. Soc. Sci. Fish. 45 (7): 829-834. July 1979. SFA 25(1)
[Fac. Fish. Anim. Husb., Hiroshima Univ., Fukuyama 720, Japan]

80-000541 Nakai, T.; Muroga, K. STUDIES ON RED SPOT DISEASE OF POND-CULTURED EELS--V. IMMUNE RESPONSE OF THE JAPANESE EEL TO THE CAUSATIVE BACTERIUM /PSEUDOMONAS ANGUILLISEPTICA/. Bull. Jpn. Soc. Sci. Fish. 45 (7): 817-821. July 1979. SFA 25(1)
[Dep. Fish., Fac. Fish. Anim. Husb., Hiroshima Univ., Fukuyama 720, Japan] Immune response of the Japanese eel (/Anguilla japonica/; average weight: 70 g) to formalin-killed /Pseudomonas anguilliseptica/ cells administered intramuscularly was studied. Experimental fish had no specific agglutinin acquired naturally. Agglutinating antibody was detected 2 weeks after vaccination at water temperatures from 15°C to 28°C and the antibody response persisted over a period of 7 weeks (maximum titer: 256), and even at 10°C it was detected as late as 7 weeks after vaccination (titer: 2). And the antibody response in the eels immunized at about 20°C was maintained over 5 months through the low temperature period (minimum: 7°C). The use of Freund's complete adjuvant had a promotive effect on the development of agglutinin titer (maximum: 4096). Vaccinated eels were highly protected against experimental infection with virulent /P. anguilliseptica/, and this protective immune response was demonstrated even after wintering. These results suggest that this vaccination method will provide cultured eels with protective immunity against naturally occurring red spot disease.

80-000542 Newman, S. G. PRODUCTION AND ROLES OF FACTORS INVOLVED IN THE PATHOGENESIS OF /VIBRIO ANGUILLARUM/ STRAIN LS-74 STUDIED IN JUVENILE CHINOOK SALMON (/ONCORHYNCHUS TSHAWYTSCHA/). Ph.D. dissertation, Univ. Miami 136p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(4):1538. Oct. 1979. SFA 25(1)

80-000543 Paterson, W. D.; Gallant, C.; Desautels, D.; Marshall, L. DETECTION OF BACTERIAL KIDNEY DISEASE IN WILD SALMONIDS IN THE MARGAREE RIVER SYSTEM AND ADJACENT WATERS USING AN INDIRECT FLUORESCENT ANTIBODY TECHNIQUE. J. Fish. Res. Board Can. 36 (12): 1464-1468. Dec. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Halifax Lab., Halifax, NS B3J 2S7, Canada]

80-000544 Weber, J. M.; Zwicker, B. M. /AEROMONAS SALMONICIDA/ IN ATLANTIC SALMON (/SALMO SALAR/): OCCURRENCE OF SPECIFIC AGGLUTININS TO THREE BACTERIAL PATHOGENS. J. Fish. Res. Board Can. 36 (9): 1102-1107. Sept. 1979. In English with French summ. SFA 25(1)
[Dep. Natl. Health Welfare, Health Prot. Br., Lab. Cent. Dis. Control, Bur. Virol., Ottawa, ON K1A 0L2, Canada]

FUNGAL DISEASES

80-000545 Taylor, S. G.; Bailey, J. E. /SAPROLEGNIA/: CONTROL OF FUNGUS ON INCUBATING EGGS OF PINK SALMON BY TREATMENT WITH SEAWATER. Prog. Fish-Cult. 47 (4): 181-183. Oct. 1979. SFA 25(1)
[NMFS, P.O. Box 155, Auke Bay, AK 99821]

PROTOZOAN DISEASES

80-000546 Burreson, E. M. STRUCTURE AND LIFE CYCLE OF /TRYPANOPLASMA BECKERI/ SP. N. (KINETOPLASTIDA), A PARASITE OF THE CABEZON, /SCORPAENICHTHYS MARMORATUS/, IN OREGON COASTAL WATERS. J. Protozool. 26 (3): 343-347. Aug. 1979. SFA 25(1)
[Va. Inst. Mar. Sci., Coll. William and Mary, Gloucester Point, VA 23062]

80-000547 Duszynski, D. W.; Solangi, M. A.; Overstreet, R. M. A NEW AND UNUSUAL EIMERIAN (PROTOZOA: EIMERIIDAE) FROM THE LIVER OF THE GULF KILLIFISH, /FUNDULUS GRANDIS/. J. Wildl. Dis. 15 (4): 543-552. Oct. 1979. SFA 25(1)
[Dep. Biol., Univ. N. Mex., Albuquerque 87131]

80-000548 Fange, R. PROTOZOAN INFECTIONS (HAEMOGREGARINES, TRYPANOSOMES) OF THE BLOOD OF THE GADOID FISH, /MELANOGRAMMUS AEGLEFINUS/ (HADDOCK) AND /GAIDROPSAURUS CIMBRIUS/ (FOUR-BEARDED ROCKLING). Acta Zool. (Stockh.) 60 (3): 129-137. 1979. SFA 25(1)
[Dep. Zoophysiol., Univ. Gothenburg, Sweden] Parasitic protozoans, identified as /Haemogregarina aeglefini/ (Henry), were found in erythrocytes of two gadiform fish, /Melanogrammus aeglefinus/ (haddock) and /Gaidropsaurus cimbrius/ (four-bearded rockling). The latter species also harboured trypanosomes in its blood plasma, and a kind of intracellular parasite-like inclusions in macrophages of the spleen, the pronephros and the liver. Most specimens of /Gaidropsaurus cimbrius had leeches (/Callobdella nodulifera/) attached to the skin. A remarkable abundance of blood leucocytes noted in /Gaidropsaurus cimbrius/ may be a response to haematozoan infections.

80-000549 Johnson, K. A.; Sanders, J. E.; Fryer, J. L. /CERATOMYXA SHASTA/ IN SALMONIDS. U.S. Fish Wildl. Serv. Fish Dis. Leafl. 58. 11p. 1979. SFA 25(1)
[Oreg. State Univ., Corvallis]

80-000550 Joshi, B. D. TWO NEW SPECIES OF TRYPANOSOMES FROM TWO FRESH WATER TELEOSTS. J. Anim. Morphol. Physiol. 25 (1/2): 1-7. June-Dec. 1978. SFA 25(1)
[Dep. Zool., Cnostituent Coll., Kumaun Univ., Almora, U.P., India]

80-000551 Kirmse, P. OBSERVATIONS ON THE ULTRASTRUCTURE OF /HAEMOGREGARINA SIMONDI/ IN THE MARINE FLATFISH /SOLEA SOLEA/ (L.). Z. Parasitenkd. 59 (2): 131-140. 1979. SFA 25(1)
[Unit Aquatic Pathobiol., Dep. Biol., Univ. Stirling, Stirling FK9 4LA, Scotland]

80-000552 Kirmse, P. REDESCRIPTION OF THE LIFE CYCLE OF /HAEMORGREGARINA SIMONDI/ (LAVERAN AND MESNIL, 1901) IN ITS VERTEBRATE HOST THE MARINE FISH /SOLEA SOLEA/ (LINNAEUS). Z. Parasitenkd. 59 (2): 141-150. 1979. SFA 25(1)
[Unit Aquatic Pathobiol., Dep. Biol., Univ. Stirling, Stirling FK9 4LA, Scotland]

## VIRAL DISEASES

80-000553 Grinnell, B.; Leong, J. C. RECOVERY AND CONCENTRATION OF INFECTIOUS PANCREATIC NECROSIS (IPN) VIRUS IN WATER. J. Fish. Res. Board Can. 36 (11): 1405-1408. Nov. 1979. In English with French summ. SFA 25(1)
[J. C. Leong: Oreg. State Univ., Corvallis 97331]

80-000554 MacMillan, J. R.; Mulcahy, D. ARTIFICIAL TRANSMISSION TO AND SUSCEPTIBILITY OF PUGET SOUND FISH TO VIRAL ERYTHROCYTIC NECROSIS (VEN). J. Fish. Res. Board Can. 36 (9): 1097-1101. Sept. 1979. In English with French summ. SFA 25(1)
[U.S. FWS, Bldg. 204, Naval Support Activity, Seattle, WA 98115]

80-000555 Plumb, J. A.; Bowser, P. R.; Grizzle, J. M.; Mitchell, A. J. FISH VIRUSES: A DOUBLE-STRANDED RNA ICOSAHEDRAL VIRUS FROM A NORTH AMERICAN CYPRINID. J. Fish. Res. Board Can. 36 (11): 1390-1394. Nov. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Allied Aquacult., Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830]

80-000556 Vaughan, G. E. COMPARATIVE VULNERABILITY OF BLUEGILLS WITH AND WITHOUT LYMPHOCYSTIS DISEASE TO PREDATION BY LARGEMOUTH BASS. Prog. Fish-Cult. 41 (3): 163-164. July 1979. SFA 25(1)
[U.S. FWS, Nashua Natl. Fish Hatchery, Nashua, NH 03060]

## OTHER DISEASES AND PARASITES

80-000557 Baker, M. R. REDESCRIPTION OF /CAMALLANUS ANCYLODIRUS/ WARD AND MAGATH 1916 (NEMATODA: CAMALLANIDAE) FROM FRESHWATER FISHES OF NORTH AMERICA. J. Parasitol. 65 (3): 389-392. June 1979. SFA 25(1)
[Commonwealth Inst. Helminthol., 103 St. Peter's St., St. Albans, Herts. AL1 3EW, England]

80-000558 Barkman, L. L.; James, H. A. A POPULATION STUDY OF MONOGENETIC TREMATODES FROM THE KILLIFISH, /FUNDULUS HETEROCLITUS/ (LINNAEUS) IN CONNECTICUT. Iowa State J. Res. 54 (1): 77-81. Aug. 1979. SFA 25(1)
[Housatonic Community Coll., Bridgeport, CT 06608] /Fundulotrema prolongis/ (Hargis, 1955) Kritsky and Thatcher 1977 (=/Gyrodactylus prolongis/ Hargis, 1955), /Gyrodactylus stephanus/ Mueller, and /Urocleidus angularis/ Mueller were recovered from 68 male and 115 female killifish [/Fundulus heteroclitus/ (Linnaeus)] taken from a brackish pond in Bridgeport (Fairfield Co.) Connecticut, at 14 monthly intervals from September 1975 to November 1976. For approximately 8, 230 monogenean recovered, sites on host, incidence of infection, and intensity of infection were determined. Seasonal parasite burden was examined relative to total length of host, sex of host, and water temperature. Large hosts and female hosts tended to have more parasites. Population peaks of monogenean species (three from gills and one from sediment) occurred in February, March, April, and June at water temperatures of 5°C, 9.5°C, 14°C, and 30°C, respectively.

80-000559 Bilgees, F. M. /RHABDOCHONA PARASTROMATEI/ SP. N. (NEMATODA, RHABDOCHONIDAE) FROM THE FISH /PARASTROMATEUS NIGER/ (BLEEKER) OF THE KARACHI COAST. Zool. Scr. 8 (2): 107-110. 1979. SFA 25(1)
[Sch. Parasitol., Dep. Zool., Univ. Karachi, Karachi, Pakistan]

80-000560 Blasiola, G. C., Jr. /SERPENTISACCUS MAGNIFICAE/ GEN. ET SP. N., A COPEPOD (CALIGOIDA: LERNAEOCERIDAE) FROM THE FIREFISH, /NEMATELEOTRIS MAGNIFICA/ FOWLER, 1938. J. Parasitol. 65 (4): 662-665. Aug. 1979. SFA 25(1)
[Steinhart Aquarium, Calif. Acad. Sci., San Francisco, CA 94118]

80-000561 Brandal, P. O.; Egidius, E. TREATMENT OF SALMON LICE (/LEPEOPHTHEIRUS SALMONIS/ KROYER, 1838) WITH NEGUVON--DESCRIPTION OF METHOD AND EQUIPMENT. Aquaculture 18 (2): 183-188. Oct. 1979. SFA 25(1)
[Inst. Mar. Res., C. Sundtsgt. 37,5000 Bergen, Norway] A bath treatment of 300 p.p.m. Neguvon for 15-60 min effectively eliminates the salmon louse, /Lepeophtheirus salmonis/, from salmonids cultured in sea water. Serious epizootics caused by this parasite have arisen in recent years in Norwegian salmonid farms. The treatment is applied using a special floating pen enabling the same solution to be used for different fish populations. Neguvon residues in treated fish are negligible within 12 days of treatment. Fish should not be harvested within 3 weeks of treatment and the Neguvon should be used under veterinary prescription in Norway.

80-000562 Dartnall, H. J. G.; Walkey, M. THE DISTRIBUTION OF GLOCHIDIA OF THE SWAN MUSSEL, /ANODONTA CYGNEA/ (MOLLUSCA) ON THE THREE-SPINED STICKLEBACK /GASTEROSTEUS ACULEATUS/ (PISCES). J. Zool. (Lond.) 189 (1): 31-37. Sept. 1979. SFA 25(1)
[Brit. Antarctic Surv., Madingley Rd., Cambridge, England]

80-000563 Fast, A. W. NITROGEN GAS SUPERSATURATION DURING ARTIFICIAL AERATION AT LAKE CASITAS, CALIFORNIA. Prog. Fish-Cult. 41 (3): 153-155. July 1979. SFA 25(1)
[Limnological Assoc., P.O. Box 1056, Kaneohe, HI 96744]

80-000564 Gayevskaya, A. V.; Kovaljova, A. A. [MONOGENEANS FROM THE ATLANTIC HORSE MACKERELS OF THE GENUS /TRACHURUS/.] Zool. Zh. 58 (8): 1110-1116. Aug. 1979. In Russian with English summ. SFA 25(1)
[Atl. Res. Inst. Fish. Oceanogr., Kaliningrad, USSR]

80-000565 Ghichenok, L. A. [MONOGENEANS FROM FLYING FISHES OF THE GENUS /EXOCOETUS/ (BELONIFORMES) FROM THE INDIAN AND PACIFIC OCEANS.] Zool. Zh. 58 (7): 958-968. July 1979. In Russian with English summ. SFA 25(1)
[Biol. Fac., Univ. Moscow, USSR]

80-000566 Hanson, A. W. /DICLIDOPHORA EMBIOTOCAE/ SP. N. (MONOGENEA, DICLIDOPHORIDAE), A PARASITE OF EMBIOTOCID FISHES OF OREGON. J. Parasitol. 65 (3): 457-459. June 1979. SFA 25(1)
[Dep. Biol., Whittier Coll., Whittier, CA 90608]

80-000567 Hendrickson, G. L. /ORNITHODIPLOSTOMUM PTYCHOCHEILUS/: MIGRATION TO THE BRAIN OF THE FISH INTERMEDIATE HOST, /PIMEPHALES PROMELAS/. Exp. Parasitol. 48 (2): 245-258. Oct. 1979. SFA 25(1)
[Dep. Fish., Humboldt State Univ., Arcata, CA 95521]

80-000568 Hewitt, G. C. EIGHT SPECIES OF PARASITIC COPEPODA ON A WHITE SHARK. N.Z. J. Mar. Freshwater Res. 13 (1): 171. 1979. SFA 25(1)
[Zool. Dep., Victoria Univ. Wellington, Private Bag, Wellington, New Zealand] The Copepoda /Nemesis lamna/, /Pandarus satyrus/, /Nesippus orientalis/, /Pandarus bicolor/, /Echthrogaleus coleoptratus/, /E. denticulatus/, /Dinemoura latifolia/, and /D. producta/ are recorded from a specimen of /Carcharodon carcharias/ taken near Wellington, New Zealand. Evidence is given that at least one species has undergone habitat shift due to site competition.

80-000569 Kennedy, C. R. THE DISTRIBUTION AND BIOLOGY OF THE CESTODE /EUBOTHRIUM PARVUM/ IN CAPELIN, /MALLOTUS VILLOSUS/, (PALLAS) IN THE BARENTS SEA, AND ITS USE AS A BIOLOGICAL TAG. J. Fish Biol. 15 (2): 223-236. Aug. 1979. SFA 25(1)
[Dep. Biol. Sci., The University, Exeter, England]

80-000570 McVicar, A. H. THE DISTRIBUTION OF CESTODES WITHIN THE SPIRAL INTESTINE OF /RAJA NAEVUS/ MULLER & HENLE. Int. J. Parasitol. 9 (3): 165-176. June 1979. SFA 25(1)
[DAFS, Mar. Lab., Victoria Rd., Aberdeen AB9 8DB, Scotland]

80-000571 Prabha, C.; Pillai, N. K. /PSEUDECHETUS FIMBRIATUS/ GEN. ET SP. NOV., A CALIGID COPEPOD FROM KERALA COASTAL WATERS. Parasitology 79 (3): 425-429. Dec. 1979. SFA 25(1)
[Dep. Aquatic Biol. Fish., Univ. Kerala, Trivandrum 695007, India]

80-000572 Rohde, K. MONOGENEAN GILL PARASITES OF SOME MARINE FISHES OF PAPUA NEW GUINEA. Zool. Anz. 203 (1/2): 78-94. 1979. In English with German summ. SFA 25(1)
[Dep. Zool., Univ. New England, Armidale, Australia]

80-000573 Romestand, B.; Trilles, J.-P. INFLUENCE DES CYMOTHOADIENS /MEINERTIA OESTROIDES/, /MEINERTIA PARALLELA/ ET /ANILOCRA PHYSODES/ (CRUSTACES, ISOPODES; PARASITES DE POISSONS) SUR LA CROISSANCE DES POISSONS HOTES /BOOPS BOOPS/ ET /PAGELLUS ERYTHRINUS/ (SPARIDES). [INFLUENCE OF THE CYMOTHOID ISOPODS /MEINERTIA OESTROIDES/, /MEINERTIA PARALLELA/, AND /ANILOCRA PHYSODES/ (CRUSTACEA; PARASITES OF FISH) ON THE GROWTH OF HOSTS, /BOOPS BOOPS/ AND /PAGELLUS ERYTHRINUS/ (SPARIDAE).] Z. Parasitenkd. 59 (2): 195-202. 1979. In French with English summ. SFA 25(1)
[Univ. Sci. Tech. Languedoc, Montpellier, France]

80-000574 Sogandares-Bernal, F.; Hietala, H. J.; Gunst, R. F. METACERCARIAE OF /ORNITHODIPLOSTOMUM PTYCHOCHEILUS/ (FAUST, 1917) DUBOIS, 1936 ENCYSTED IN THE BRAINS AND VISCERA OF RED-SIDED SHINERS FROM THE CLARK-FORK AND BITTERROOT RIVERS OF MONTANA: AN ANALYSIS OF THE INFECTED HOSTS. J. Parasitol. 65 (4): 616-623. Aug. 1979. SFA 25(1)
[Dep. Biol., South. Methodist Univ., Dallas, TX]

80-000575 Tkachuk, L. P. [NEW SPECIES OF TREMATODES FROM THE DEEPWATER ZEIDAE OF THE INDIAN AND ATLANTIC OCEANS.] Zool. Zh. 58 (9): 1290-1295. Sept. 1979. In Russian with English summ. SFA 25(1)
[Inst. Biol. South Seas, Acad. Sci. Ukrainian SSR, Sevastopol, USSR]

80-000576 Wood, C. M.; McMahon, B. R.; McDonald, D. G. RESPIRATORY, VENTILATORY, AND CARDIOVASCULAR RESPONSES TO EXPERIMENTAL ANAEMIA IN THE STARRY FLOUNDER, /PLATICHTHYS STELLATUS/. J. Exp. Biol. 82: 139-162. Oct. 1979. SFA 25(1)
[Dep. Biol., McMaster Univ., 1280 Main St. West, Hamilton, ON L8S 4K1, Canada] Unrestrained, quiescent starry flounder maintained approximately normal levels of O(2) uptake in the face of severe experimental anaemia. At haematocrits above about 5 percent, the only major compensation was a reduction in venous O(2) tension which lowered venous saturation and thereby kept a constant difference between arterial and venous O(2) contents. Below a haematocrit of about 5 percent, this difference decreased, and many additional compensations were invoked, including increases in ventilation, expired O(2) tension, arterial O(2) tension, and cardiac output, and decreases in systemic vascular resistance and blood pH. All changes could be reversed by restoration of haematocrit. Exercise performance and post-exercise changes in blood pH and lactate differed only slightly between anaemic and normal flounder. In wild flounder, anaemia commonly occurs and apparently only causes death at the haematocrit value (about 5 percent) below which most major compensations are implemented. The respiratory strategy of the flounder during anaemia is compared with that of the rainbow trout.

POLLUTION

80-000577 Ames, L. J.; Felley, J. D.; Smith, M. H. AMOUNTS OF ASYMMETRY IN CENTRARCHID FISH INHABITING HEATED AND NONHEATED RESERVOIRS. Trans. Am. Fish. Soc. 108 (5): 489-495. Sept. 1979. SFA 25(1)
[J. D. Felley: Dep. Zool., Univ. Okla., Norman 73019]

80-000578 Amico, V.; Impellizzeri, G.; Oriente, G.; Piattelli, M.; Sciuto, S.; Tringali, C. LEVELS OF CHLORINATED HYDROCARBONS IN MARINE ANIMALS FROM THE CENTRAL MEDITERRANEAN. Mar. Pollut. Bull. 10 (10): 282-284. Oct. 1979. SFA 25(1)
[Ist. Dip. Chim. Chim. Ind., Univ. Catania, Catania, Italy]

80-000579 Black, J. J. CARCINOGENIC HAZARDS IN AQUATIC ECOSYSTEMS. Ph.D. dissertation, State Univ. N.Y. (Buffalo) 121p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(4):1608. Oct. 1979. SFA 25(1)
A portion of the Western New York Great Lakes aquatic environment was examined for polynuclear aromatic hydrocarbon (PAH) pollution. Chemical characterization of contaminants present in bottom sediments was carried out using reversed phase high pressure liquid chromatography (HPLC) applied to fractions which were derived by routine organic extraction and separation methods. The HPLC chromatograms obtained from the bottom sediments and those from analogous fractions isolated from tissue samples of aquatic biota were compared. Correlations in the PAH composition of the contaminated sediments to that found in the biota were demonstrated. The HPLC analysis of fractions isolated from sediment, Tubifex worms, aquatic snails and fish tissue samples clearly indicated the presence of a characteristic PAH "fingerprint" in all segments of the aquatic food chain. The patterns of horizontal distribution of the relative levels of PAH clearly indicate a point source of the pollution in the Buffalo River. A sample of the feral fish population indicated the presence of several kinds of lesions that appear to be neoplasms. The histology of these lesions is described. The significance of the results in terms of a possible hazard to human health is discussed.

80-000580 Bollingberg, H. J.; Johansen, P. LEAD IN SPOTTED WOLFFISH, /ANARHICHAS MINOR/, NEAR A ZINC-LEAD MINE IN GREENLAND. J. Fish. Res. Board Can. 36 (9): 1023-1028. Sept. 1979. In English with French summ. SFA 25(1)
[Inst. Petrol., Univ. Copenhagen, Oster Voldgade 7, 1350 Copenhagen K, Denmark]

80-000581 Burton, D. T.; Hall, L. W., Jr.; Margrey, S. L.; Small, R. D. INTERACTIONS OF CHLORINE, TEMPERATURE CHANGE (DELTA T), AND EXPOSURE TIME ON SURVIVAL OF STRIPED BASS (/MORONE SAXATILIS/) EGGS AND PROLARVAE. J. Fish. Res. board Can. 36 (9): 1108-1113. Sept. 1979. In English with French summ. SFA 25(1)
[Acad. Nat. Sci. Phila., Benedict Estuarine Res. Lab., Benedict, MD 20612]

80-000582 Caputi, N.; Edmonds, J. S.; Heald, D. I. MERCURY CONTENT OF SHARK FROM SOUTH-WESTERN AUSTRALIAN WATERS. Mar. Pollut. Bull. 10 (11): 337-340. Nov. 1979. SFA 25(1)
[West. Aust. Mar. Res. Lab., P.O. Box 20, North Beach, Western Australia 6020]

80-000583 Cheevaparanapivat, V.; Menasveta, P. TOTAL AND ORGANIC MERCURY IN MARINE FISH OF THE UPPER GULF OF THAILAND. Bull. Environ. Contam. Toxicol. 23 (3): 291-299. Oct. 1979. SFA 25(1)
[Inst. Environ. Res., Fac. Sci., Chulalongkorn Univ., Bangkok, Thailand]

80-000584 Cherry, D. S.; Larrick, S. R.; Guthrie, R. K.; Davis, E. M.; Sherberger, F. F. RECOVERY OF INVERTEBRATE AND VERTEBRATE POPULATIONS IN A COAL ASH STRESSED DRAINAGE SYSTEM. J. Fish. Res. Board Can. 36 (9): 1089-1096. Sept. 1979. In English with French summ. SFA 25(1)
[Biol. Dep. VPI&SU, Blacksburg, VA 24061]

80-000585 Clark, R. B. POLLUTION IS GOOD FOR YOU (OR IT WILL BE, SOON). Mar. Pollut. Bull. 10 (7): 181-182. July 1979. SFA 25(1)
[Dep. Zool., University, Newcastle-upon-Tyne NE1 7RU, U.K.]

80-000586 Cole, H. A. , (organizer) THE ASSESSMENT OF SUBLETHAL EFFECTS OF POLLUTANTS IN THE SEA. Philos. Trans. R. Soc. Lond. B Biol. Sci. 286 (1015): 397-633. 9 Aug. 1979. SFA 25(1)
A collection of papers.

80-000587 Contardi, V.; Capelli, R.; Pellacani, T.; Zanicchi, G. PCBS AND CHLORINATED PESTICIDES IN ORGANISMS FROM THE LIGURIAN SEA. Mar. Pollut. Bull. 10 (10): 307-311. Oct. 1979. SFA 25(1)
[Ist. Chim. Gen., Univ. Genoa, Genoa, Italy]

80-000588 Cox, J. POWER PLANT LAKES HEAT UP WINTER FISHING. Tex. Parks Wildl. 37 (12): 23-24. Dec. 1979. SFA 25(1)

80-000589 Dunn, B. P.; Fee, J. POLYCYCLIC AROMATIC HYDROCARBON CARCINOGENS IN COMMERCIAL SEAFOODS. J. Fish. Res. Board Can. 36 (12): 1469-1476. Dec. 1979. In English with French summ. SFA 25(1)
[Environ. Carcinogin. Unit, B.C. Cancer Res. Cent., Vancouver, BC V5Z 1L3, Canada]

80-000590 Eagle, R. A.; Hardiman, P. A.; Norton, M. G.; Nunny, R. S. THE FIELD ASSESSMENT OF EFFECTS OF DUMPING WASTES AT SEA: 4. A SURVEY OF THE SEWAGE SLUDGE DISPOSAL AREA OFF PLYMOUTH. Fish. Res. Tech. Rep. Minist. Agric. Fish. Food (Lowestoft) No. 50. 24p. 1979. SFA 25(1)
[M. G. Norton: Fish. Lab , Burnhan-on-Crouch, U.K.]

80-000591 Gretch, F. M.; Barry, T. L.; Petzinger, G.; Geltman, J. IDENTIFICATION OF THE HERBICIDE 2,4,6-TRICHLOROPHENYL P⁴-NITROPHENYL ETHER IN IMPORTED RAINBOW TROUT. Bull. Environ. Contam. Toxicol. 23 (1/2): 165-169. Sept. 1979. SFA 25(1)
[U.S. Food Drug Admin., 850 Third Ave., Brooklyn, NY 11232]

80-000592 Grove, P.; Moller, P. ELECTRIC FISH AS A TOOL FOR WATER QUALITY ASSESSMENT. Trans. Am. Fish. Soc. 108 (4): 420-421. July 1979. SFA 25(1)
[City Coll. City Univ. N.Y., New York 10031]

80-000593 Heit, M. VARIABILITY OF THE CONCENTRATIONS OF SEVENTEEN TRACE ELEMENTS IN THE MUSCLE AND LIVER OF A SINGLE STRIPED BASS, /MORONE SAXATILIS/. Bull. Environ. Contam. Toxicol. 23 (1/2): 1-5. Sept. 1979. SFA 25(1)
[Environ. Measurements Lab., U.S. Dep. Energy, New York, NY 10014]

80-000594 Milner, N. J. ZINC CONCENTRATIONS IN JUVENILE FLATFISH. J. Mar. Biol. Assoc. U.K. 59 (3): 761-775. Aug. 1979. SFA 25(1)
[Univ. Wales, Inst. Sci. Technol., Field Cent., Newbridge-on-Wye, Powys, Wales]

80-000595 Miyazaki, T.; Akiyama, K.; Kaneko, S.; Horii, S.; Yamagishi, T. IDENTIFICATION OF TRANS-NONACHLOR IN GOBY-FISH FROM TOKYO BAY. Bull. Environ. Contam. Toxicol. 23 (4/5): 631-635. Nov. 1979. SFA 25(1)
[Tokyo Metro. Res. Lab. Pub. Health 24-1, 3-chome, Hyakunincho, Shinjuku-ku, Tokyo, 160 Japan]

80-000596 Musial, C. J.; Uthe, J. F.; Wiseman, R. J.; Matheson, R. A. OCCURRENCE OF PCB RESIDUES IN BURBOT (/LOTA LOTA/) AND LAKE TROUT (/SALVELINUS NAMAYCUSH/) FROM THE CHURCHILL FALLS POWER DEVELOPMENT AREA. Bull. Environ. Contam. Toxicol. 23 (1/2): 256-261. Sept. 1979. SFA 25(1)
[Fish. Environ. Can., 1707 Lower Water St., P.O. Box 550, Halifax, NS B3J 2S7, Canada]

80-000597 Nesler, T. P.; Bachmann, R. W. INFLUENCE OF COAL MINING ON WATER QUALITY IN MARION AND MAHASKA COUNTIES, IOWA. Proc. Iowa Acad. Sci. 86 (4): 149-153. Dec. 1979. SFA 25(1)
[Dep. Anim. Ecol., Iowa State Univ., Ames 50011] In the spring and summer of 1976, a water-sampling program was carried out on the streams of Marion and Mahaska counties, where a significant portion of the coal mining in Iowa has occurred. Streams with underground mines or combinations of underground and surface mines in their watersheds had decreased values for alkalinity and increased values for specific conductance and sulfates, indicating the presence of acid mine drainage. Unless reclamation procedures are incorporated into standard mining operations, an expansion of Iowa coal mining could lead to an increase in the severity of this problem.

80-000598 Nieman, D. A.; Clady, M. D. FLORIDA AND NORTHERN LARGEMOUTH BASS: GROWTH AND SURVIVAL IN A HEATED RESERVOIR. Proc. Okla. Acad. Sci. 59: 47-50. 1979. SFA 25(1)
[Okla. Dep. Wildl. Conserv., 1801 N. Lincoln Blvd., Oklahoma City 73105] In Boomer Lake, a shallow, turbid Oklahoma reservoir receiving a heated effluent, Florida largemouth bass (/Micropterus salmoides floridanus/) grew significantly faster than northern largemouth bass (/M. s. salmoides/) during the first summer of life. Because Florida bass were smaller when stocked, however, the faster growth does not indicate a difference in growth potential. On the average, Florida and northern bass were the same size by the first fall, and the two subspecies grew at a similar rate over the next 1.5 years. Both subspecies suffered heavy initial mortality, presumably from stocking stress. After the first summer, the survival of northern bass was: winter 1976-77, 100 percent; summer 1977, 97 percent; and winter 1977-78, 45 percent. Seasonal survival rates of Florida bass over the same periods, 43, 45, and 58 percent, respectively, were independent of winter severity. Total survival of northern bass (10 percent) was significantly higher than that of Florida bass (1 percent) over 2 years. Florida bass offer no apparent management benefits in Boomer Lake.

80-000599 Niimi, A. J. HEXACHLOROBENZENE (HCB) LEVELS IN LAKE ONTARIO SALMONIDS. Bull. Environ. Contam. Toxicol. 23 (1/2): 20-24. Sept. 1979. SFA 25(1)
[Great Lakes Biolimnol. Lab., 867 Lakeshore Rd., Burlington, ON L7R 4A6, Canada]

80-000600 Niimi, A. J.; Burnison, G. A. RECOVERY OF $^{14}$C-LABELLED POLYCHLORINATED BIPHENYLS (PCB) IN FISH TISSUE USING A COMBUSTION AND A SOLUBILIZATION METHOD OF SAMPLE PREPARATION FOR SCINTILLATION ANALYSIS. Bull. Environ. Contam. Toxicol. 23 (4/5): 597-600. Nov. 1979. SFA 25(1)
[Great Lakes Biolimnol. Lab., Can. Cent. Inland Waters, 867 Lakeshore Rd., Burlington, ON L7R 4A6, Canada]

80-000601 Parvaneh, V. AN INVESTIGATION ON THE MERCURY CONTAMINATION OF PERSIAN GULF FISH. Bull. Environ. Contam. Toxicol. 23 (3): 357-359. Oct. 1979. SFA 25(1)
[Dep. Food Hygiene, Univ. Tehran, P.O. Box 3262, Tehran, Iran]

80-000602 Persson, P.-E. THE SOURCE OF MUDDY ODOR IN BREAM (/ABRAMIS BRAMA/) FROM THE PORVOO SEA AREA (GULF OF FINLAND). J. Fish. Res. Board Can. 36 (8): 883-890. Aug. 1979. In English with French summ. SFA 25(1)
[Dep. Limnol., Univ. Helsinki, Viikki, SF-00710 Helsinki 71, Finland]

80-000603 Slooff, W. DETECTION LIMITS OF A BIOLOGICAL MONITORING SYSTEM BASED ON FISH RESPIRATION. Bull. Environ. Contam. Toxicol. 23 (4/5): 517-523. Nov. 1979. SFA 25(1)
[Natl. Inst. Water Supply, Chem. Biol. Div., P.O. Box 150, Leidschendam, The Netherlands]

80-000604 Smokler, P. E.; Young, D. R.; Gard, K. L. DDTS IN MARINE FISHES FOLLOWING TERMINATION OF DOMINANT CALIFORNIA INPUT: 1970-77. Mar. Pollut. Bull. 10 (11): 331-334. Nov. 1979. SFA 25(1)
[Dep. Environ. Sci. Eng., Univ. Calif., Los Angeles 90024] Through source control, total DDT annual emissions from the Los Angeles County Sanitation Districts' submarine outfalls decreased by a factor of 30 between 1971 and 1977. Here we report persistent elevated levels of DDT residues measured in three species of marine fishes with distinctly different feeding habits. Over the study interval, median levels of DDT residues have decreased 3-fold (8-fold and 4-fold from peak medians) in flesh of black perch and kelp bass. However, there was no apparent decrease in Dover sole. The sediment reservoir is the likely source of persistent contamination of fishes in the discharge area.

80-000605 Thorhaug, A.; Roessler, M. A.; Bach, S. D.; Hixon, R.; Brook, I. M.; Josselyn, M. N. BIOLOGICAL EFFECTS OF POWER-PLANT THERMAL EFFLUENTS IN CARD SOUND, FLORIDA. Environ. Conserv. 6 (2): 127-137. 1979. SFA 25(1)
[Dep. Biol. Sci., Fla. Inst. Univ., Tamiami Campus, Miami 33199]

80-000606 Veith, G. D.; DeFoe, D. L.; Bergstedt, B. V. MEASURING AND ESTIMATING THE BIOCONCENTRATION FACTOR OF CHEMICALS IN FISH. J. Fish. Res. Board Can. 36 (9): 1040-1048. Sept. 1979. In English with French summ. SFA 25(1)
[U.S. EPA, Duluth, MN 55804]

80-000607 Williams, D. C.; Hom, K. B. ONSHORE IMPACTS OF OFFSHORE OIL: A USER'S GUIDE TO ASSESSMENT METHODS. U.S. Dep. Interior 68p. May 1979. For sale by Sup. Doc. USGPO, Washington, DC, Stock no. 024-000-00859-2. SFA 25(1)

TOXICOLOGY; BIOASSAYS

80-000608 Adragna, P. J.; Privitera, C. A. ZINC EFFECTS ON LDH, MDH AND ALKALINE PHOSPHATASE FROM CULTURES OF FATHEAD MINNOW CELLS. Comp. Biochem. Physiol. B Comp. Biochem. 64 (2): 219-224. 1979. SFA 25(1)
[C. A. Privitera: Dep. Biol. Sci., State Univ. N.Y. at Buffalo, Amherst 14260] Three purported zinc metalloenzymes have been investigated from cell cultures of the fathead minnow (/Pimephales promelas/). With the addition of increasingly higher concentrations of zinc to the tissue culture medium, the specific activity of LDH increased. The results with MDH were equivocal. The specific activity of alkaline phosphatase decreased in the presence of increasing amounts of zinc in the growth medium. Zinc exogenously added to the LDH enzyme assay did not alter the LDH enzyme activity of cells grown without zinc.

80-000609 Agrawal, S. J.; Srivastava, A. K.; Chaudhry, H. S. HAEMATOLOGICAL EFFECTS OF NICKEL TOXICITY ON A FRESH WATER TELEOST, /COLISA FASCIATUS/. Acta Pharmacol. Toxicol. 45 (3): 215-217. Sept. 1979. SFA 25(1)

[A. K. Srivastava: Dep. Zool., Univ. Gorakhpur, Gorakhpur, 273001, U.P., India] /Colisa fasciatus/, a freshwater teleost, were exposed for 90 hrs to 45 p.p.m. nickel sulphate under static test conditions. The treatment resulted in leucopenia due to reduction in the number of small lymphocytes and polycythemia with concomitant increases in the haematocrit and haemoglobin values, and in retardation of the erythrocyte sedimentation rate of the moribund fish. No differences in total thrombocyte count, clotting time, and hepatosomatic index were found between the control and the treated fish. Lymphopenia and erythrocytosis may be used in presumptive monitoring nickel toxicity in fish.

80-000610 Akagi, H.; Mortimer, D. C.; Miller, D. R. MERCURY METHYLATION AND PARTITION IN AQUATIC SYSTEMS. Bull. Environ. Contam. Toxicol. 23 (3): 372-376. Oct. 1979. SFA 25(1)

[Inst. Publ. Health, Minato-ku, Tokyo, Japan]

80-000611 Alderson, R. THE EFFECT OF AMMONIA AND THE GROWTH OF JUVENILE DOVER SOLE, /SOLEA SOLEA/ (L.) AND TURBOT, /SCOPHTHALMUS MAXIMUS/ (L.). Aquaculture 17 (4): 291-309. Aug. 1979. SFA 25(1)

[Unilever Res., Colworth Lab., Lochailort, Inverness-shire, Great Britain] The growth of sole and turbot was followed in groups of fish exposed to constant unionised ammonia concentrations at pH levels both at and below that of normal sea water. Low pH levels were produced by the addition of carbon dioxide. Results for both species showed evidence for a threshold level of unionised ammonia below which little or no effect on growth was evident. This level was determined to be 0.066 mg N/l for sole and 0.11 mg N/l for turbot at 16°C, 34°/oo salinity. The different pH conditions did not have any marked effect on these threshold levels. Above the threshold levels growth appeared to be depressed in a linear manner with increased unionised ammonia. The rate at which growth was depressed was greatest at the low pH levels for both species. The level at which growth ceased thus decreased from 0.77 to 0.38 mg N/l for sole and from 0.9 to 0.3 mg N/l for turbot, over the pH range from 7.9 to 6.9. The absence of disease and gill damage in the experimental populations is discussed. It is suggested that this and the tolerance shown by the fish, which is higher than is generally accepted for fish in high density culture, may be due to the clean environment in which the fish were held while under test.

80-000612 Bouquegneau, J. M. EVIDENCE FOR THE PROTECTIVE EFFECT OF METALLOTHIONEINS AGAINST INORGANIC MERCURY INJURIES TO FISH. Bull. Environ. Contam. Toxicol. 23 (1/2): 218-219. Sept. 1979. SFA 25(1)

[Lab. Oceanol., Univ. Liege, B-4000 Sart-Tilman par Liege 1, Belgium]

80-000613 Chambers, J. E.; Heitz, J. R.; McCorkle, F. M.; Yarbrough, J. D. ENZYME ACTIVITIES FOLLOWING CHRONIC EXPOSURE TO CRUDE OIL IN A SIMULATED ECOSYSTEM. II. STRIPED MULLET. Environ. Res. 20 (1): 140-147. Oct. 1979. SFA 25(1)
[Dep. Biol. Sci., Miss. State Univ., Mississippi State 39762] Enzyme activities were investigated in brain, gill, liver, and muscle homogenates from striped mullet which had been exposed to crude oil for 10 months in a simulated estuarine ecosystem. Enzymes assayed included acetylcholinesterase, alkaline phosphatase, beta-glucuronidase, glutamic-pyruvic transaminase, lactic dehydrogenase, and malic dehydrogenase. Few seasonal trends in enzyme activities were observed. Alterations in some enzyme activities, particularly acetylcholinesterase, beta-glucuronidase, and malic dehydrogenase, may have reflected physiological changes in the mullet resulting from stress. In general, there were few chronic alterations in mullet enzyme activities resulting from the oil spill.

80-000614 Cherry, D. S.; Larrick, S. R.; Giattina, J. D.; Dickson, K. L.; Cairns, J., Jr. AVOIDANCE AND TOXICITY RESPONSES OF FISH TO INTERMITTENT CHLORINATION. Environ. Int. 2 (2): 85-90. 1979. SFA 25(1)
[Cent. Environ. Stud., VPI & SU, Blacksburg, VA 24061]

80-000615 Clingbine, G.; Heading, C. E. EFFECT OF NEUROTUBULE DISRUPTING AGENTS ON GOLDFISH BEHAVIOUR. Physiol. Behav. 23 (2): 229-236. Aug. 1979. SFA 25(1)
[Dep. Paramed. Sci., North East Lond. Polytech., Romford Rd., London E. 15, England]

80-000616 Coats, J. R.; O'Donnell-Jeffery, N. L. TOXICITY OF FOUR SYNTHETIC PYRETHROID INSECTICIDES TO RAINBOW TROUT. Bull. Environ. Contam. Toxicol. 23 (1/2): 250-255. Sept. 1979. SFA 25(1)
[Dep. Entomol., Iowa State Univ., Ames 50011]

80-000617 Crecelius, E. A. MEASUREMENTS OF OXIDANTS IN OZONIZED SEAWATER AND SOME BIOLOGICAL REACTIONS. J. Fish. res. Board Can. 36 (8): 1006-1008. Aug. 1979. In English with French summ. SFA 25(1)
[Battelle Pac. Northwest Lab., Mar. Res. Lab., Sequim, WA 98382]

80-000618 de March, B. G. E. SURVIVAL OF /HYALELLA AZTECA/ (SAUSSURE) RAISED UNDER DIFFERENT LABORATORY CONDITIONS IN A PH BIOASSAY, WITH REFERENCES TO COPPER TOXICITY. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 894. iv + 5p. Oct. 1979. In English with French summ. SFA 25(1)
[Fish. Mar. Serv., Winnipeg, MB R3T 2N6, Canada]

80-000619 Pandrei, G.; Collins, H. L. TOTAL RESIDUAL CHLORINE: THE EFFECT OF SHORT-TERM EXPOSURE ON THE EMERALD SHINER /NOTROPIS ATHERINOIDES/ (RAFINESQUE). Bull. Environ. Contam. Toxicol. 23 (1/2): 262-268. Sept. 1979. SFA 25(1)
[Surface and Ground Water, Minn. Pollut. Control Agency, 1975 County Road B-2, Roseville 55113]

80-000620 Feroz, M.; Khan, M. A. Q. FATE OF $^{14}$C-CIS-CHLORDANE IN GOLDFISH, /CARASSIUS AURATUS/ (L.). Bull. Environ. Contam. Toxicol. 23 (1/2): 64-69. Sept. 1979. SFA 25(1)
[Dep. Biol. Sci., Univ. Ill., Box 4348, Chicago 60680]

80-000621 Ferreira, J. T.; Smit, G. L.; Schoonbee, H. J.; Holzapfel, C. W. COMPARISON OF ANESTHETIC POTENCY OF BENZOCAINE HYDROCHLORIDE AND MS-222 IN TWO FRESHWATER FISH SPECIES. Prog. Fish-Cult. 41 (3): 161-163. July 1979. SFA 25(1)
[Dep. Zool., Rand Afrikaans Univ., P.O. Box 524, Johannesburg 2000, South Africa]

80-000622 Flos, R.; Caritat, A.; Balasch, J. ZINC CONTENT IN ORGANS OF DOGFISH (/SCYLIORHINUS CANICULA/ L.) SUBJECT TO SUBLETHAL EXPERIMENTAL AQUATIC ZINC POLLUTION. Comp. Biochem. Physiol. C Comp. Pharmacol. 64 (1): 77-81. 1979. SFA 25(1)
[Dep. Fisiol. Anim., Fac. Cienc., Univ. Autonoma Barcelona, Belleterra, Barcelona, Spain] Zn content of liver, pancreas, spleen, kidney, and muscle of zinc-treated and untreated dogfish were analysed. Liver and spleen accumulate Zn after 14 days of treatment; liver, spleen and pancreas, after 25 days. According to the Wilcoxon test, liver Zn accumulation was significantly higher than spleen at 14 days. The pancreas accumulate significantly more Zn than liver and spleen at 25 days. Comparing the results with our work on the effect of Zn in gills, we conclude that when working in sublethal conditions (15 ppm) Zn toxicity would be bound to organs injury.

80-000623 Goodman, L. R.; Hansen, D. J.; Coppage, D. L.; Moore, J. C.; Matthews, E. DIAZINON: CHRONIC TOXICITY TO, AND BRAIN ACETYLCHOLINESTERASE INHIBITION IN, THE SHEEPSHEAD MINNOW, /CYPRINODON VARIEGATUS/. Trans. Am. Fish. Soc. 108 (5): 479-488. Sept. 1979. SFA 25(1)
[U.S. EPA, Environ. Res. Lab., Gulf Breeze, FL 32561]

80-000624 Han, J. C-Y. RESIDUE STUDIES WITH ($^{14}$C) FOSAMINE AMMONIUM IN CHANNEL CATFISH. J. Toxicol. Environ. Health 5 (5): 957-963. Sept. 1979. SFA 25(1)
[Biochem. Dep., Exp. Stn., E.I. duPont de Nemours & Co., Inc., Wilmington, DE] The active ingredient in du Pont Krenite brush control agent is ammonium ethyl carbamoylphosphonate (fosamine ammonium salt, formerly known as DPX-1108). Residues in channel catfish exposed to 1.1 ppm $^{14}$C-carbonyl-labeled fosamine ammonium in water for 4 wk were found to plateau in 2-3 wk with an accumulation factor (ration of residue in fish to residue in water) of less than 1. In a separate experiment, channel catfish were placed for 4 wk in a tank containing ($^{14}$C) fosamine ammonium-treated soil (15 ppm) that had been aged for 30 d prior to flooding and initiation of fish exposure. The residue levels in this latter group of catfish also plateaued in 2-3 wk with an accumulation factor of less than 1. In both experiments, after the 4-wk exposures, the fish were transferred to fresh water for 2-wk depuration periods, during which residue levels dropped 50-90 percent. No effects on the fish were observed during these experiments.

80-000625 Hawryshyn, C. W.; Mackay, W. C. TOXICITY AND TISSUE UPTAKE OF METHYLMERCURY ADMINISTERED INTRAPERITONEALLY TO RAINBOW TROUT (/SALMO GAIRDNERI/ RICHARDSON). Bull. Environ. Contam. Toxicol. 23 (1/2): 79-86. Sept. 1979. SFA 25(1)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

80-000626 Henry, M. G.; Atchison, G. J. INFLUENCE OF SOCIAL RANK ON THE BEHAVIOUR OF BLUEGILL, /LEPOMIS MACROCHIRUS/ RAFINESQUE EXPOSED TO SUBLETHAL CONCENTRATIONS OF CADMIUM AND ZINC. J. Fish Biol. 15 (3): 309-315. Sept. 1979. SFA 25(1)
[Dep. Anim. Ecol., Iowa State Univ., Ames 50011] The influence of social rank on changes in /Lepomis macrochirus/ behaviour brought about by exposure to sublethal concentrations of cadmium and zinc was studied. Significant changes occurred in the frequency of eight of the nine behavioural acts quantified. The effects of metals on the behaviour of individuals was often related to the individual's social status in the hierarchies that had formed. The majority of agonistic behaviours (nips and nudges) were performed by dominant individuals and the majority of comfort behaviours (coughs, yawns, jerks, jerk swimming, fin flickering and chafes) occurred in subordinate individuals. These differences occurred during the control period as well as the treatment period and are thought to be in part caused by socially induced stress.

80-000627 Hodson, P. V. METERING DEVICE FOR TOXICANTS USED IN BIOASSAYS WITH AQUATIC ORGANISMS. Prog. Fish-Cult. 41 (3): 129-131. July 1979. SFA 25(1)
[Great Lakes Biolimnol. Lab., Canada Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

80-000628 Iwama, G. K.; Greer, G. L. TOXICITY OF SODIUM PENTACHLOROPHENATE TO JUVENILE CHINOOK SALMON UNDER CONDITIONS OF HIGH LOADING DENSITY AND CONTINUOUS-FLOW EXPOSURE. Bull. Environ. Contam. Toxicol. 23 (4/5): 711-716. Nov. 1979. SFA 25(1)
[Minist. Recreation Conserv., Fish Wildl. Br., 400-1019 Wharf St., Victoria, BC V8W 2Y9, Canada]

80-000629 Jay, F. B.; Muncy, R. J. TOXICITY TO CHANNEL CATFISH OF WASTEWATER FROM AN IOWA COAL BENEFICIATION PLANT. Iowa State J. Res. 54 (1): 45-50. Aug. 1979. SFA 25(1)
[Water Treatment Plant, Ventura, CA 93003] Chemical analyses by Inductively Coupled Plasma, multielement Optical Emission Spectroscopy for 30 major cations in a closed, coal-washing, wastewater system revealed only mercury approaching levels considered acutely toxic to fish judging by published toxicity data. In two of five 96-hour static tests, mortalities were recorded for fingerling channel catfish (/Ictalurus punctatus/) exposed to high concentrations of wastewater. Mortalities were recorded also in two series by use of pH-altered reconstituted water to which finely ground coal had been added to simulate levels of settleable solids found in coal-cleaning wastewater. Mortality of fingerling channel catfish was interrelated with high concentrations of settleable solids, pH below 4.5, and lowered dissolved oxygen concentrations.

80-000630 Johnson, A. G.; Williams, T. D.; Messinger, J. F. III; Arnold, C. R. LARVAL SPOTTED SEATROUT (/CYNOSCION NEBULOSUS/) A BIOASSAY SUBJECT FOR THE MARINE SUBTROPICS. Contrib. Mar. Sci. 22: 57-62. Aug. 1979. SFA 25(1)
[NMFS, Panama City, FL 32407] Larval spotted sea trout were selected as the test subject because specimens can be produced under laboratory conditions throughout the year by adjusting the temperature and photoperiod. Tests were made to determine the sensitivity of spotted sea trout larvae to water samples from different environments and to Baton Rouge No. 2 fuel oil. Considerable variation in water quality was found within a small area with regard to larval mortality. Sublethal fuel oil concentrations (0.00-1.00 ppm) produced a general decrease in total body length and critical distance. An increase in unpigmented eyes occurred with an increase in fuel oil concentrations.

80-000631 Khangarot, B. S.; Rajbanshi, V. K. EXPERIMENTAL STUDIES ON TOXICITY OF ZINC TO A FRESHWATER TELEOST, /RASBORA DANICONIUS/ (HAMILTON). Hydrobiologia 65 (2): 141-144. 17 Aug. 1979. SFA 25(1)
[Dr. V. K. Rajbanshi: Dep. Limnol. Fish., Univ. Udaipur, Udaipur 313001, India] /Rasbora daniconius/ (Ham.) were exposed to zinc sulphate up to 15 days under static bioassay test conditions with renewal of the test solutions every 24 hours. Simultaneously control fish were also kept in water without zinc. The 96 and 240 hr LC(50) values were 38.1 and 33.3 ppm of zinc respectively. A reduced mortality rate was observed after 96 hr and LC(50) approached a constant value at 240 hr of exposure to the toxicant. Fish showed abnormal behaviour, deposition of mucus and appearance of haemorrhage on the body in case of higher concentrations of zinc, before death. The reported LC(50) values in the present study were comparatively higher than those reported by earlier investigators.

80-000632 Kincheloe, J. W.; Wedemeyer, G. A.; Koch, D. L. TOLERANCE OF DEVELOPING SALMONID EGGS AND FRY TO NITRATE EXPOSURE. Bull. Environ. Contam. Toxicol. 23 (4/5): 575-578. Nov. 1979. SFA 25(1)
[U.S. FWS, Div. Ecol. Serv., 727 N.E. 24th Ave., Portland, OR 97232]

80-000633 Kocan, R. M.; Landolt, M. L.; Sabo, K. M. /IN VITRO/ TOXICITY OF EIGHT MUTAGENS/CARCINOGENS FOR THREE FISH CELL LINES. Bull. Environ. Contam. Toxicol. 23 (1/2): 269-274. Sept. 1979. SFA 25(1)
[Dep. Pathol., SM-30, Univ. Wash., Seattle 98185]

80-000634 Leung, T. S.; Bulkley, R. V. EFFECTS OF PETROLEUM HYDROCARBONS ON LENGTH OF INCUBATION AND HATCHING SUCCESS IN THE JAPANESE MEDAKA. Bull. Environ. Contam. Toxicol. 23 (1/2): 236-243. Sept. 1979. SFA 25(1)
[11 Science Hall II, Iowa State Univ., Ames 50011]

80-000635 Lorz, H. W.; Glenn, S. W.; Williams, R. H.; Kunkel, C. M.; Norris, L. A.; Loper, B. R. EFFECTS OF SELECTED HERBICIDES ON SMOLTING OF COHO SALMON. U. S. Environ. Prot. Agency Res. Rep. Ser. EPA-600/3-79-071. xi + 103p. June 1979. SFA 25(1)
[Oreg. Dep. Fish Wildl., Corvallis 97331]

80-000636 Masri, M. S.; Hendricks, J. D.; Sinnhuber, R. O. AFLATOXIN Q(1)-MAJOR DETOXIFYING PATHWAY IN PRIMATES, CARCINOGENICITY TESTS IN RAINBOW TROUT. Toxicon 17 (suppl. 1): 116-117. 1979. SFA 25(1)
[West. Reg. Res. Lab., USDA, SEA, Berkeley, CA 94710]

80-000637 Mathur, D. S. HISTOPATHOLOGICAL CHANGES IN THE LIVER OF FISH RESULTING FROM EXPOSURE TO CERTAIN INSECTICIDES. Toxicon 17 (suppl. 1): 188. 1979. Abstract only. SFA 25(1)
[Zool. Surv. India, Jabalpur (U.P.), India]

80-000638 McDonald, T. O. COMPARISON OF THE EFFECTS OF PARATHION AND DDT ON THE CONCENTRATIONS OF SEROTONIN, NOREPINEPHRINE AND DOPAMINE IN THE BRAIN AND RETINA/PIGMENT EPITHELIUM/CHOROID OF THE GOLDFISH. Ph.D. dissertation, Tulane Univ. 105p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(3):1073. Sept. 1979. SFA 25(1)

80-000639 McLeay, D. J.; Munro, J. R. PHOTOPERIODIC ACCLIMATION AND CIRCADIAN VARIATIONS IN TOLERANCE OF JUVENILE RAINBOW TROUT (/SALMO GAIRDNERI/) TO ZINC. Bull. Environ. Contam. Toxicol. 23 (4/5): 552-557. Nov. 1979. SFA 25(1)
[Div. Appl. Biol., B.C. Research, 3650 Wesbrook Mall, Vancouver, BC V6S 2L2, Canada]

80-000640 McLeay, D. J.; Brown, D. A. STRESS AND CHRONIC EFFECTS OF UNTREATED AND TREATED BLEACHED KRAFT PULPMILL EFFLUENT ON THE BIOCHEMISTRY AND STAMINA OF JUVENILE COHO SALMON (/ONCORHYNCHUS KISUTCH/). J. Fish. Res. Board Can. 36 (9): 1049-1059. Sept. 1979. In English with French summ. SFA 25(1)
[Div. Appl. Biol., B.C. Research, Vancouver, BC V6S 2L2, Canada]

80-000641 Miller, R. A.; Norris, L. A.; Loper, B. R. THE RESPONSE OF COHO SALMON AND GUPPIES TO 2,3,7,8-TETRACHLORODIBENZO-/P/-DIOXIN (TCDD) IN WATER. Trans. Am. Fish. Soc. 108 (4): 401-407. July 1979. SFA 25(1)
[U.S. For. Serv., Pac. Northwest For. Range Exp. Stn., For. Sci. Lab., Corvallis, OR 97331]

80-000642 Moles, A.; Rice, S. D.; Korn, S. SENSITIVITY OF ALASKAN FRESHWATER AND ANADROMOUS FISHES TO PRUDHOE BAY CRUDE OIL AND BENZENE. Trans. Am. Fish. Soc. 108 (4): 408-414. July 1979. SFA 25(1)
[NMFS, P.O. Box 155, Auke Bay, AK 99821]

80-000643 Moshkov, D. A.; Tiras, N. R.; Miroshnikov, A. I. EFFECT OF APAMINE ON THE ULTRASTRUCTURE OF MAUTHNER'S NEURONS IN FISH. Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.) 245: 851-853. Sept. 1979. SFA 25(1)
[Inst. Biol. Phys., Acad. Sci., USSR, Pushcino, Moscow Region, USSR]

80-000644 Narbonne, J. F.; Gallis, J. L. /IN VIVO/ AND /IN VITRO/ EFFECT OF PHENOCLOR DP6 ON DRUG METABOLIZING ACTIVITY IN MULLET LIVER. Bull. Environ. Contam. Toxicol. 23 (3): 338-343. Oct. 1979. SFA 25(1)
[Lab. Physiol. Nutr., Univ. Bordeaux 1, F 33405 Talence, France]

80-000645 Parkhurst, B. R.; Bradshaw, A. S.; Forte, J. L.; Wright, G. P. AN EVALUATION OF THE ACUTE TOXICITY TO AQUATIC BIOTA OF A COAL CONVERSION EFFLUENT AND ITS MAJOR COMPONENTS. Bull. Environ. Contam. Toxicol. 23 (3): 349-356. Oct. 1979. SFA 25(1)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

80-000646 Pfeifer, K. F.; Weber, L. J. THE EFFECT OF CARBON TETRACHLORIDE ON THE TOTAL PLASMA PROTEIN CONCENTRATION OF RAINBOW TROUT, /SALMO GAIRDNERI/. Comp. Biochem. Physiol. C Comp. Pharmacol. 64 (1): 37-42. 1979. SFA 25(1)
[Dep. Fish. Wildl., Oreg. State Univ., Corvallis 97331] The effect of a single i.p. injection of CCl(4) on total plasma protein and albumin concentrations was measured in the rainbow trout. CCl(4) treatment caused a significant reduction in total plasma protein concentration at 12, 24 and 36 hr post-treatment. At 24 hr post-treatment plasma albumin concentration was significantly reduced only in fish given the highest dose of CCl(4) (2.0 ml/kg). Several factors, including intestinal inflammation and hemorrhages, could have contributed to the decreased plasma protein concentration in the trout.

80-000647 Post, G. CARBONIC ACID ANESTHESIA FOR AQUATIC ORGANISMS. Prog. Fish-Cult. 41 (3): 142-144. July 1979. SFA 25(1)
[Dep. Fish. Wildl. Biol., Colo. State Univ., Fort Collins 80523]

80-000648 Redner, B. D.; Stickney, R. R. ACCLIMATION TO AMMONIA BY /TILAPIA AUREA/. Trans. Am. Fish. Soc. 108 (4): 383-388. July 1979. SFA 25(1)
[Dep. Biol., Memphis State Univ., Memphis, TN 38152]

80-000649 Roch, M.; Maly, E. J. RELATIONSHIP OF CADMIUM-INDUCED HYPOCALCEMIA WITH MORTALITY IN RAINBOW TROUT (/SALMO GAIRDNERI/) AND THE INFLUENCE OF TEMPERATURE ON TOXICITY. J. Fish. Res. Board Can. 36 (11): 1297-1303. Nov. 1979. In English with French summ. SFA 25(1)
[Dep. Biol., Concordia Univ., Montreal, PQ H3G 1M8, Canada]

80-000650 Rosage, T. F.; Schutsky, R. M.; Rapp, K. M. TOXICITY OF UN-IONIZED AMMONIA TO THE SPOTFIN SHINER (/NOTROPIS SPILOPTERUS/). Proc. Pa. Acad. Sci. 53 (1): 39-42. 1979. SFA 25(1)
[RMC Ecol. Div., Muddy Run Lab., P.O. Box 10, Drumore, PA 17518] The toxicity of un-ionized ammonia (NH(3)-N) to spotfin shiner, /Notropis spilopterus/, 31-85 mm total length was determined in two tests 25.5 C. The resultant 96-hour TL(50) values were 1.0 to 1.3 mg/l unionized ammonia; TL(50) was 1.17 mg/l for the combined data. Results of this and other studies indicate that TL(50) values of warmwater species are higher than those of cold water species. Findings of this study may be applicable for development of ammonia discharge criteria for warmwater environments.

80-000651 Sergeant, D. B.; Zitko, V. THE DETERMINATION OF TRICHLORFON, DICHLORVOS, FENITROTHION AND PHOSPHAMIDON IN WATER. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 886. iii + 12p. June 1979. In English with French summ. SFA 25(1)
[Biol. Stn., St. Andrews, NB EOG 2X0, Canada]

80-000652 Sharma, S. K.; Chaturvedi, L. D.; Sastry, K. V. ACUTE ENDRIN TOXICITY ON OXIDASES OF /OPHIOCEPHALUS PUNCTATUS/ (BLOCH). Bull. Environ. Contam. Toxicol. 23 (1/2): 153-157. Sept. 1979. SFA 25(1)
[Dep. Zool., Hindu Coll., Moradabad, 244001, India]

80-000653 Shrivastava, R. S.; Dwivedi, P. STUDIES ON THE EFFECTS OF ACIDIC MEDIUM ON THE FRY OF /CYPRINUS CARPIO/. Acta Hydrochim. Hydrobiol. 7 (4): 421-430. 1979. SFA 25(1)
[Holkars Sci. Coll., Dep. Zool., Indore, India]

80-000654 Sivarajah, K.; Franklin, C. S.; Williams, W. P. SOME STUDIES ON THE HEPATIC MICROSOMAL ENZYME ACTIVITIES AND STEROID HORMONE LEVELS IN CARP, /CYPRINUS CARPIO/ EXPOSED FOR SIX MONTHS. J. Fish Biol. 15 (3): 249-253. Sept. 1979. SFA 25(1)
[Dep. Pharmacol., Chelsea Coll., Univ. London, Manresa Rd., London SW3 6LX, England]

80-000655 Solbakken, J. E.; Palmork, K. H.; Neppelberg, T.; Scheline, R. R. DISTRIBUTION OF RADIACTIVITY IN COALFISH (/POLLACHIUS VIRENS/) FOLLOWING INTRAGASTRIC ADMINISTRATION OF [9-$^{14}$C] PHENANTHRENE. Bull. Environ. Contam. Toxicol. 23 (1/2): 100-103. Sept. 1979. SFA 25(1)
[Inst. Fish. Biol., Univ. Bergen, Nordnesparken 2a, 5011 Bergen/Nordnes, Norway]

80-000656 Takeda, M.; Ueda, T. ACCUMULATION OF MERCURY AND SELENIUM IN CULTURED YELLOWTAIL. Bull. Jpn. Soc. Sci. Fish. 45 (7): 901-904. July 1979. In Japanese with English summ. SFA 25(1)
[Dep. Food Sci. Technol., Shimonoseki Univ. Fish., Shimonoseki 759-65, Japan]

80-000657 Tomasso, J. R.; Simco, B. A.; Davis, K. B. CHLORIDE INHIBITION OF NITRITE-INDUCED METHEMOGLOBINEMIA IN CHANNEL CATFISH (/ICTALURUS PUNCTATUS/). J. Fish. Res. Board Can. 36 (9): 1141-1144. Sept. 1979. In English with French summ. SFA 25(1)
[Ecol. Res. Cent., Dep. Biol., Memphis State Univ., Memphis, TN 38152]

80-000658 Tsai, C. SURVIVAL, OVERTURNING AND LETHAL EXPOSURE TIMES FOR THE PEARL DACE, /SEMOTILUS MARGARITUS/ (COPE), EXPOSED TO COPPER SOLUTION. Comp. Biochem. Physiol. C Comp. Pharmacol. 64 (1): 1-6. 1979. SFA 25(1)
[Cent. Environ. Estuarine Stud., Univ. Md., College Park 20742]
Pearl dace were exposed to copper solutions at concentrations of 1.01, 9.25, 73.7 and 279 mg/l for periods of up to 420 min and then transferred to clean water. Survival, overturning and lethal exposure times of fish decreased as exposure time increased at each concentration. The median lethal exposure time was shorter than the median overturning time and much shorter than the median survival

80-000658 CONTINUED
time, suggesting that the fish had received a lethal dose of copper before they overturned. The overturning period for fish overturned and killed in copper solutions averaged 10.9 min and was independent of exposure time, survival time and copper concentration. For those fish overturned and killed after being transferred to clean water, the overturning period increased as survival time increased.

80-000659 Uviovo, E. J.; Beatty, D. D. EFFECTS OF CHRONIC EXPOSURE TO ZINC ON REPRODUCTION IN THE GUPPY (/POECILIA RETICULATA/). Bull. Environ. Contam. Toxicol. 23 (4/5): 650-657. Nov. 1979. SFA 25(1)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

80-000660 Van den Berg, C. M. G.; Wong, P. T. S.; Chau, Y. K. MEASUREMENT OF COMPLEXING MATERIALS EXCRETED FROM ALGAE AND THEIR ABILITY TO AMELIORATE COPPER TOXICITY. J. Fish. Res. Board Can. 36 (8): 901-905. Aug. 1979. In English with French summ. SFA 25(1)
[Geol. Dep., McMaster Univ., Hamilton, ON L8S 4M1, Canada]

80-000661 Varanasi, U.; Gmur, D. J.; Treseler, P. A. INFLUENCE OF TIME AND MODE OF EXPOSURE ON BIOTRANSFORMATION OF NAPHTHALENE BY JUVENILE STARRY FLOUNDER (/PLATICHTHYS STELLATUS/) AND ROCK SOLE (/LEPIDOPSETTA BILINEATA/). Arch. Environ. Contam. Toxicol. 8 (6): 673-692. 1979. SFA 25(1)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

80-000662 Voyer, R. A.; Heltsche, J. F.; Kraus, R. A. HATCHING SUCCESS AND LARVAL MORTALITY IN AN ESTUARINE TELEOST, /MENIDIA MENIDIA/ (LINNAEUS), EXPOSED TO CADMIUM IN CONSTANT AND FLUCTUATING SALINITY REGIMES. Bull. Environ. Contam. Toxicol. 23 (4/5): 475-481. Nov. 1979. SFA 25(1)
[U.S. EPA, South Ferry Rd., Narragansett, RI 02882]

80-000663 Yamagishi, T.; Akiyama, K.; Morita, M.; Takahashi, R.; Miyazaki, T.; Kaneko, S. DETERMINATION METHOD FOR RESIDUAL 1,3-DICHLORO- AND 1,3,5-TRICHLORO-2-(4-NITROPHENOXY) BENZENE (NIP AND CNP) IN FISH AND SHELLFISH. Bull. Environ. Contam. Toxicol. 23 (1/2): 57-63. Sept. 1979. SFA 25(1)
[Tokyo Metro. Res. Lab. Public Health, 3-24-1, Hyakunin-cho, Shinjiku-ku, Tokyo, 160 Japan]

FISH TOXICANTS

80-000664 Chandler, J. H., Jr.; Marking, L. L. TOXICITY OF FISHERY CHEMICALS TO THE ASIATIC CLAM, /CORBICULA MANILENSIS/. Prog. Fish-Cult. 41 (3): 148-151. July 1979. SFA 25(1)
[U.S. FWS, P.O. Box 9, Warm Springs, GA 31830]

80-000665 Engstrom-Heg, R.; Colesante, R. T. PREDICTING ROTENONE DEGRADATION IN LAKES AND PONDS. N.Y. Fish Game J. 26 (1): 22-36. Jan. 1979. SFA 25(1)
The rate of natural degradation of rotenone in a lake was estimated by suspending rotenone solutions at a series of depths in clear and opaque plastic bags. Logarithms of rate constants for all deep samples and for surface and epilimnetic samples in opaque bags were proportional to temperature, with degradation occurring more slowly than was estimated by Post (1958). Detoxification of surface samples in clear bags was in good agreement with Post's findings, indicating that light plays an important role in detoxification of surface waters. Equations were developed for estimating detoxification times and appropriate treatment dates in relation to the fall overturn for lakes and ponds under a variety of conditions.

RESEARCH AND MANAGEMENT-GENERAL

80-000666 Dahlberg, M. L. HISTORY OF THE FISHERY AND SUMMARY STATISTICS OF THE SOCKEYE SALMON, /ONCORHYNCHUS NERKA/, RUNS TO THE CHIGNIK LAKES, ALASKA, 1888-1966. NOAA Tech. Rep. NMFS SSRF- 735. iv + 16p. Aug. 1979. SFA 25(1)
[NMFS, Box 155, Auke Bay, AK 99821] Annual runs of sockeye salmon to the Chignik Lakes, Alaska, decreased from an average of 1.9 million during the period 1922-39 to an average of 0.9 million during the period 1949-66. In order to study the dynamics of the runs' historic catch, escapement and age structure data were compiled by spawning stock and brood year. The history of fishing and management of the runs from inception of the fishery until 1966 is described. The high seas and coastal distributions of Chignik sockeye salmon indicated significant interception by the fishery in only one area other than the Chignik Bay and Chignik Lagoon; the fishery at Cape Igvak started in the mid-1960's. Results of the study were used to construct parent-progeny relationships that formed the basis for a management strategy to restore the runs to their former level of abundance.

80-000667 FAO of the UN REPORT OF THE TENTH SESSION OF THE EUROPEAN INLAND FISHERIES ADVISORY COMMISSION. HAMBURG, 20-27 JUNE 1978. FAO Fish. Rep. No. 219. vi + 62p. 1979. SFA 25(1)
[Rome, Italy]

80-000668 Grant, B. F.; Putz, R. E.; Hutton, R. F.; Dillard, J. G.; Kirkland, L. A.; Regier, H. A. STATUS OF CURRENT RESEARCH IN FISHERIES. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 157-165. 1979. SFA 25(1)
[U.S. FWS, Natl. Fish Health Res. Lab., Kearneysville, WV]

80-000669 Landry, J. L.; Hirsch, L. P.; McCaffrey, E. R. A RATING SYSTEM FOR THREATENED AND ENDANGERED SPECIES OF WILDLIFE. N.Y. Fish Game J. 26 (1): 11-21. Jan. 1979. SFA 25(1)
A rating system for systematically determining the relative status of native wildlife species and for assessing the likelihood that the potential for survival of a threatened or endangered species can be enhanced by the efforts of a wildlife agency is described. The status index is derived from graded evaluations under a degree of threat factor, a regional uniqueness factor and a social-ecological-economic factor. The program success index is derived from the status index and a recovery potential factor. The evaluations to be applied under each

80-000669 CONTINUED
factor are defined and given numerical values that can then be used in equations to yield comparable ratings. The status and program indices, considered in conjunction with the required actions and estimated costs of an effective management effort, provide the basis for developing a comprehensive, justifiable and effective endangered species program.

80-000670 Lynch, J. T. THE ROLE OF LAW ENFORCEMENT IN NEW YORK FISHERIES MANAGEMENT. Fisheries (Bull. Am. Fish. Soc.) 4 (5): 2, 4-6. Sept.-Oct. 1979. SFA 25(1)

80-000671 Maher, F. P. THE SPORT FISHERY FUTURE IN ONTARIO. Ont. Fish Wildl. Rev. 18 (1): 24-28. 1979. SFA 25(1)

80-000672 McMinds, G. R. THE NORTHWEST FISHING RIGHTS CONTROVERSY: AN INDIAN PERSPECTIVE. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 604-617. 1979. SFA 25(1)
[Northwest Indian Fish. Comm., Quinalt Treaty Area, Taholah, WA]

80-000673 Moyle, P. B.; Andrews, R. E.; Jenkins, R. M.; Noble, R. L; Saila, S. B.; Wick, W. O. RESEARCH NEEDS IN FISHERIES. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 176-187. 1979. SFA 25(1)
[Dep. Wildl. Fish. Biol., Univ. Calif., Davis]

80-000674 Nicholas, D. VIEW OF THE NATIONAL INDIAN BROTHERHOOD OF CANADA. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 601-603. 1979. SFA 25(1)
[Natl. Indian Brotherhood, Ottawa, ON, Canada]

80-000675 Smith, S. C.; Cross, G. H.; Chapman, D. R.; Farris, A. L.; Stroud, R. H. ASSESSMENT OF PROBLEMS IN FISH AND WILDLIFE RESEARCH. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 143-147. 1979. SFA 25(1)
[Sch. Nat. Resour., Univ. Wis., Madison]

80-000676 Stansby, M. E. FEDERAL FISHERY RESEARCH IN THE PACIFIC NORTHWEST PRECEDING FORMATION OF NORTHWEST FISHERIES CENTER. U.S. Dep. Commer. Natl. Mar. Fish. Serv. 35p. Nov. 1979. SFA 25(1)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

80-000677 Thompson, T. P. JOB SATISFACTION AMONG FISHERIES PROFESSIONALS: A REPORT TO THE SAMPLE. Fisheries (Bull. Am. Fish. Soc.) 4 (4): 7-13. July-Aug. 1979. SFA 25(1)
[Dep. Sociol., Queens Coll., Charlotte, NC]

80-000678 Walker, H. INDIAN HUNTING AND FISHING RIGHTS. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 618-619. 1979. SFA 25(1)
[U.S. Dep. Inter., Washington, DC]

ADMINISTRATION AND PLANNING

80-000679 Edwards, W. R.; Hale, J. B.; Timmerman, J. A., Jr.; Youatt, W. G.; Doig, H. THE ROLE OF STATE AGENCIES IN FISH AND WILDLIFE RESEARCH. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 197-208. 1979. SFA 25(1)
[Sect. Wildl. Res., Ill. Nat. Hist. Surv., Urbana]

80-000680 Hoekstra, T. W.; Schweitzer, D. L.; Cushwa, C. T.; Anderson, S. H.; Barnes, R. B. PRELIMINARY EVALUATION OF A NATIONAL WILDLIFE AND FISH DATA BASE. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 380-391. 1979. SFA 25(1)
[USDA, For. Serv., Fort Collins, CO]

80-000681 Labisky, R. F.; Klimstra, W. D.; Gray, J. L.; Jahn, L. R.; Sullivan, C. R.; Zagata, M. D. ENABLING MECHANISMS FOR THE SUPPORT OF FISH AND WILDLIFE RESEARCH AT ACADEMIC INSTITUTIONS. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 217-222. 1979. SFA 25(1)
[Sch. For. Resour. Conserv., Univ. Fla., Gainesville]

80-000682 Loveless, C. M.; Crawford, J. E.; Jones, C.; Linn, R.; Ripley, T.; Smith, D. R. THE ROLE OF FEDERAL AGENCIES IN FISH AND WILDLIFE RESEARCH. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 188-196. 1979. SFA 25(1)
[For. Environ. Res., USDA, For. Serv., Washington, DC]

80-000683 McGaw, R. L.; Sinclair, W. F. COMMENT ON MANAGEMENT ALTERNATIVES AND STRATEGIC PLANNING FOR CANADA'S FISHERIES. J. Fish. Res. Board Can. 36 (11): 1417-1418. Nov. 1979. In English with French summ. SFA 25(1)
[Dep. Econ., Univ. New Brunswick, Fredericton, NB E3B 5A3, Canada]

80-000684 Weller, M. W.; Kevern, N. R.; Peterle, T. J.; Progulske, D. R.; Teer, J. G.; Tubb, R. A. ROLE OF UNIVERSITIES IN FISH AND WILDLIFE RESEARCH. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 209-216. 1979. SFA 25(1)
[Dep. Entomol. Fish. Wildl., Univ. Minn., St. Paul]

REPORTS OF FISHERY STATIONS, STATES, ETC.

80-000685 Anonymous REPORT ON THE SEA AND INLAND FISHERIES OF NORTHERN IRELAND 1978. Northern Ireland Dep. Agric. 27p. 1979. SFA 25(1)
[Northern Ireland Dep. Agric., Belfast, Northern Ireland]

80-000686 FAO of the UN GENERAL FISHERIES COUNCIL FOR THE MEDITERRANEAN. REPORT OF THE FOURTEENTH SESSION NANTES, FRANCE, 16-20 OCTOBER 1978. Gen. Fish. Counc. Mediterr. 14: 42p. 1978. SFA 25(1)
[Rome, Italy]

80-000687 Fisheries and Environment Canada ANNUAL REPORT 1977/1978. Fish. Environ. Can. 67p. 1979.
[Ottawa K1A 0H3, Canada]
[Ottawa K1A 0H3, Canada]

HABITAT ALTERATION

80-000688 Bacon, J. R.; Maas, R. P. CONTAMINATION OF GREAT SMOKY MOUNTAINS TROUT STREAMS BY EXPOSED ANAKEESTA FORMATIONS. J. Environ. Qual. 8 (4): 538-543. Oct.-Dec. 1979. SFA 25(1)
[Dep. Chem., West. Carolina, Univ., Cullowhee, NC 38723] Anakeesta formations, prevalent geologic deposits in the Great Smoky Mountains National Park (GSMNP), when exposed to air and water release an acid and heavy metal containing leachate into several GSMNP streams, rendering them virtually lifeless. Anakeesta pyrite affecting Beech Flats Creek was exposed during the construction of U.S. Highway 441, while exposures affecting Alum Cave Creek and Walker Prong are naturally occurring. The road cut on U.S. 441 at Beech Flats Creek acts as point source of various contaminants. The acidity increases 100-fold (pH 6.7 to 4.7) in the several hundred meters where the stream flows through a road cut fill area. Manganese and zinc were the main metallic ions introduced at the road cut. The zinc increased from 6 to nearly 200 ppb and the manganese increased from an undetectable level to over 250 ppb. Seasonal variations below the road show a high concentration near 500 ppb in the summer to a low concentration near 100 ppb in the winter for both manganese and zinc. Both manganese and zinc showed the dilution effect expected going downstream away from the road cut. Alum Cave Creek and Walker Prong showed much lower levels of manganese and zinc and no point source could be located. The results of the present study should prove useful to National Park personnel in making management decisions. This is especially important in view of several proposed new roads in the Great Smoky Mountains National Park.

80-000689 Ditton, R. B.; Graefe, A. R.; Fedler, A. J.; Schwartz, J. D. ACCESS TO AND USAGE OF OFFSHORE LIBERTY SHIP REEFS IN TEXAS. Mar. Fish. Rev. 41 (9): 25-31. Sept. 1979. SFA 25(1)
[Dep. Recreation Parks, Tex. A&M Univ., College Station 77843] Although artificial reefs have been deployed to increase fish stocks in the United States for over a century, few studies have been done to evaluate the benefits of such reefs. This study seeks to identify the extent to which the Texas Liberty Ship reefs are used by recreational fisherman. Two independent surveys were used to address the two principal means of gaining access to Liberty Ship reefs. One study focused on the Texas charter and party boat fleet and the other on private boat fishermen residing in the Houston-Galveston metropolitan area. The Liberty Ship reefs were found to attract a substantial number of private boat and charter/party boat fishermen, especially when the extent of use is compared with other site-specific artificial or natural offshore attractions. Nearly all use of the Liberty Ship reefs originated from the closest access point. Use of a particular reef site appears to be related to the availability of alternative fishing grounds and the capability to travel great distances offshore.

80-000690 Graynoth, E. EFFECTS OF LOGGING ON STREAM ENVIRONMENTS AND FAUNAS IN NELSON. N.Z. J. Mar. Freshwater Res. 13 (1): 79-109. 1979. SFA 25(1)
[Fish. Res. Div., Minist. Agric. Fish., Private Bag, Christchurch, New Zealand]

80-000691 Parker, R. O., Jr.; Stone, R. B.; Buchanan, C. C. ARTIFICIAL REEFS OFF MURRELLS INLET, SOUTH CAROLINA. Mar. Fish. Rev. 41 (9): 12-24. Sept. 1979. SFA 25(1)
[NMFS, Beaufort, NC 28516] Between the spring of 1971 and the summer of 1974, the benthic community of reefs constructed of vessels and tires in 35 feet (11 m) of water off Murrells Inlet, S.C., was studied by scuba divers. Sixty-three species representing 33 families were observed; the most frequently encountered species were: black sea bass, /Centropristis striata/; longspine porgy, /Stenotomus caprinus/; pinfish, /Lagodon rhomboides/; spottail pinfish, /Diplodus holbrooki/; pigfish, /Orthopristis chrysoptera/; tomtate, /Haemulon aurolineatum/; scad, /Decapterus/ sp.; Atlantic spadefish, /Chaetodipterus faber/; cubbyu, /Equetus umbrosus/; Carolina hake, /Urophycis earlii/; sheepshead, /Archosargus probatocephalus/; and summer flounder, /Paralichthys dentatus/. Some species resided on the reefs throughout the year but fluctuated in abundance with the seasons; others were seasonal residents. Several species inhabited specific areas of the reefs. In the summer and fall, tropical fishes occupied the reefs but they rarely over-wintered. In the winter there were fewer species of fish but larger individuals.

80-000692 Smith, G. B.; Hensley, D. A.; Mathews, H. H. COMPARATIVE EFFICACY OF ARTIFICIAL AND NATURAL GULF OF MEXICO REEFS AS FISH ATTRACTANTS. Fla. Dep. Nat. Resour. Mar. Res. Lab. Res. Publ. No. 35. 7p. June 1979. SFA 25(1)
[Fla. Dep. Nat. Resour., Mar. Res. Lab., 100 8th Ave. SE, St. Petersburg 33701] Fish communities at artificial and natural reefs off west-central Florida were studied and described. Artificial reefs consisting of automobile tires and concrete culvert harbored an ichthyofauna considered qualitatively identical to that of nearby natural reefs. Fish density was greatest over artificial substrates, probably due to their greater structural complexity. Relative species abundance varied according to reef type.

80-000693 Stone, R. B.; Pratt, H. L.; Parker, R. O., Jr.; Davis, G. E. A COMPARISON OF FISH POPULATIONS ON AN ARTIFICIAL AND NATURAL REEF IN THE FLORIDA KEYS. Mar. Fish. Rev. 41 (9): 1-11. Sept. 1979. SFA 25(1)
[NMFS, Washington, DC 20235] An artificial reef was placed adjacent to a natural coral patch reef of similar size to study the feasibility of increasing fish carrying capacity and total biomass with in a given area by augmenting natural reef habitat. After the artificial reef had been in place 7 months, visual observations indicated about equal numbers of fishes and similar species composition on both the artificial reef and the natural patch reef. Although the artificial reef was less than 25 m from the natural reef, but it did not diminish the resident populations of the natural reef, but doubled the carrying capacity and fish biomass in the immediate vicinity of the two reefs. For the remaining 2 years of this study, the fish populations on both reefs showed similar seasonal fluctuations.

80-000694 Van Dolah, R. F.; Calder, D. R.; Knott, D. M.; Maclin, M. S. EFFECTS OF DREDGING AND UNCONFINED DISPOSAL OF DREDGED MATERIAL ON MACROBENTHIC COMMUNITIES IN SEWEE BAY, SOUTH CAROLINA. S.C. Mar. Resour. Cent. Tech. Rep. No. 39. 54p. Apr. 1979. SFA 25(1)
[Mar. Resour. Cent., S.C. Wildl. Mar. Resour. Dep., Charleston 29412]

HARVEST, CREEL CENSUS

80-000695 Bell, F. W. RECREATIONAL VERSUS COMMERCIAL FISHING IN FLORIDA: AN ECONOMIC IMPACT ANALYSIS. Fla. State Univ., Policy Sci. Prog. iii + 26p. 30 Apr. 1979. SFA 25(1)

80-000696 Farr, D. H.; Blake, L. M. A CREEL CENSUS OF THE SALMONID FISHERY IN SOUTH SANDY CREEK, NEW YORK. N.Y. Fish Game J. 26 (1): 1-10. Jan. 1979. SFA 25(1)
A creel census of the salmonid fishery (primarily for chinook salmon) in South Sandy Creek (N.Y.) was conducted in the fall of 1976 to determine fishing pressure, number of fish taken and catch rate. A total of 3,266 anglers spent 9,066 hours fishing the 6.75-mile study section during the 44-day census period. Fishing pressure on weekends and holidays differed significantly from that on weekdays. Fish caught totalled 5,469 for a catch rate of 0.6 per hour for all anglers and 1.06 per hour for successful anglers. Chinook salmon constituted 96 percent of the catch. Just prior to the start of the census, possession of any salmon was prohibited due to Mirex contamination. Nevertheless, substantial fishing pressure was observed indicating the importance of the fishery for sport fishing alone, although a dramatic increase did follow the later relaxation of the ban. It is pointed out that the data reflect a fishery under unique controls and do not represent typical conditions.

80-000697 Gustaveson, A. W.; Stowell, F. M.; Hepworth, D. K. A REVIEW OF FISHING SUCCESS AND PRESSURE ON LAKE POWELL 1964-1976. Utah State Div. Wildl. Resour. Publ. No. 79-4. ii + 24p. 1979. SFA 25(1)
[Utah Div. Wildl. Resour., Salt Lake City] Creel census at four access areas on Lake Powell between 1964-1976 resulted in over 41,500 interviews. Total boat use increased fivefold while fishing pressure doubled. Over half of the anglers interviewed resided in Arizona. Average catch rate for all species of fish was 0.56 fish/hr. Catch rates appeared depressed in areas of high fishing pressure. Species composition of the creel for the total period was 47 percent largemouth bass, 25 percent black crappie and 28 percent other species.

80-000698 Lenanton, R. C. J. THE INSHORE-MARINE AND ESTUARINE LICENSED AMATEUR FISHERY OF WESTERN AUSTRALIA. West. Aust. Mar. Res. Lab. Fish. Res. Bull. No. 23. 33p. 1979. SFA 25(1)
[Dep. Fish. Wildl., Perth, Western Australia]

80-000699 Smith, J. E. CATCH AND EFFORT STATISTICS OF THE CANADIAN GROUNDFISH FISHERY ON THE PACIFIC COAST IN 1978. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 891. iv + 82p. July 1979. In English with French summ. SFA 25(1)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]
Catch and effort statistics for the Canadian groundfish fishery (excluding halibut) on the Pacific coast in 1978 are presented. Statistics are shown by major and minor statistical areas by month, in both pounds and metric tons. Total landing in 1978 were 70 million lb (27.233 m.t.), an increase of 15 percent from 1977. The bulk (86 percent) of the catch was taken by trawl gear. The main species landed were Pacific cod, various rockfish species, pollock and turbot.

80-000700 Spenard, P. LA PECHE AU HARENG AUX ILES-DE-LA-MADELEINE, 1900-1978. [THE FISHERY FOR HERRING AT MAGDALEN ISLANDS, 1900-1978.] Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 876. x + 84p. May 1979. In French with English summ. SFA 25(1)
[Minist. Fish. Oceans, 901, Cap Diamant, Quebec, PQ, Canada]

80-000701 Warren, J. P.; Griffin, W. L. GROUNDFISH TRAWLER PROFITABILITY, NORTHERN GULF OF MEXICO. Mar. Fish. Rev. 41 (8): 15-22. Aug. 1979. SFA 25(1)
[Dep. Agric. Econ., Tex. A&M Univ., College Station 77843]

80-000702 Yuen, H. S. H. A NIGHT HANDLINE FISHERY FOR TUNAS IN HAWAII. Mar. Fish. Rev. 41 (8): 7-14. Aug. 1979. SFA 25(1)
[NMFS, Honolulu, HI 96812]

## REGULATIONS

80-000703 Tatum, R. FISH LIMITS...ARE THEY STILL NECESSARY? Tenn. Wildl. 3 (1): 13. July-Aug. 1979. SFA 25(1)
[Tenn. Wildl. Resour. Agency, Nashville 37204]

## FISH CONTROL AND REMOVAL

80-000704 Laarman, P. W. EVALUATION OF A CHEMICAL RECLAMATION AND RESTOCKING PROGRAM ON THE HURON RIVER IN THE DETROIT METROPOLITAN AREA. Mich. Dep. Nat. Resour. Fish. Res. Rep. No. 1866. 34p. 21 June 1979. SFA 25(1)
About 40 miles of the Huron River, including seven impoundments (1215 ha) in Washtenaw and Wayne counties, were treated with 2 ppm of rotenone. Chemical treatment was done in three segments between October 1972 and October 1973. An estimated 1,016 metric tons of fish (95 percent carp) were eradicated and more than 17 million fish of desirable species were stocked to provide a sport fishery. The major evaluation was done by post-treatment creel censuses on the three segments of the river. Post-treatment censuses were conducted during the open-water seasons from 1974-1976 on the upper section, 1974-1977 on Ford Lake, and 1975-1978 on Belleville Lake. Pre-treatment data were taken from a one-year census in 1972 on the upper section and from a mail survey in 1973 on Belleville Lake. On the upper segment of the river, no significant change in fishing pressure was evident after treatment. On Ford Lake and Belleville Lake during the post-treatment

80-000704 CONTINUED
period, the mean annual increases in angler trips were 18,259 and 83, 388, respectively. Based on an expanded 5-year pre- and post-treatment period and a recreational value of $8.99 per angler trip, the benefit: cost ratio was 4.1:1 (plus or minus 5.3:1) on the upper segment, 5.7:1 (plus or minus 1.0:1) on Ford Lake, and 25.3:1 (plus or minus 4.5:1) on Belleville Lake. The benefit:cost ratio for the entire reclamation project was 13.9:1 (plus or minus 2.2:1).

MARKING AND TAGGING

80-000705 Gray, R. H.; Haynes, J. M. SPAWNING MIGRATION OF ADULT CHINOOK SALMON (/ONCORHYNCHUS TSHAWYTSCHA/) CARRYING EXTERNAL AND INTERNAL RADIO TRANSMITTERS. J. Fish. Res. Board Can. 36 (9): 1060-1064. Sept. 1979. In English with French summ. SFA 25(1)
[Freshwater Sci., Ecosyst. Dep., Battelle, Pac. Northwest Lab., Richland, WA 99352]

80-000706 Gunn, J. M.; Ridgeway, J. M.; Rubec, P. J.; Qadri, S. U. GROWTH CURTAILMENT OF BROWN BULLHEADS TAGGED DURING THE SPRING SPAWNING PERIOD. Prog. Fish-Cult. 47 (4): 216-217. Oct. 1979. SFA 25(1)
[Minist. Nat. Resour., Box 3500, Sudbury, ON P3A 4S2, Canada]

80-000707 Harshbarger, T. J. SCRAPING IMPROVES SILVER NITRATE BRANDS ON TROUT. Prog. Fish-Cult. 47 (4): 209. Oct. 1979. SFA 25(1)
[U.S. For. Serv., Southeast For. Exp. Stn., Asheville, NC 28806]

80-000708 Jones, R. MATERIALS AND METHODS USED IN MARKING EXPERIMENTS IN FISHERY RESEARCH. FAO Fish. Tech. Pap. No. 190. 134p. 1979. Available from FAO of the UN, Rome, Italy SFA 25(1)
[Mar. Lab., Aberdeen, Scotland]

80-000709 MacCrimmon, H. R.; Robbins, W. H. SUITABILITY OF JAW AND ATKINS STREAMER TAGS FOR MARKING SMALLMOUTH BASS, /MICROPTERUS DOLOMIEUI/. Trans. Am. Fish. Soc. 108 (5): 499-501. Sept. 1979. SFA 25(1)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

80-000710 McNeil, F. I.; Crossman, E. J. FIN CLIPS IN THE EVALUATION OF STOCKING PROGRAMS FOR MUSKELLUNGE, /ESOX MASQUINONGY/. Trans. Am. Fish. Soc. 108 (4): 335-343. July 1979. SFA 25(1)
[E. J. Crossman: Dep. Ichthyol. Herpetol., Royal Ontario Mus., Toronto, ON M5S 2C6, Canada]

STOCKING AND INTRODUCTIONS

80-000711 Bjornn, T. C.; Hiebert, P.; Ringe, R. R. SEAWARD MIGRATION OF DWORSHAK HATCHERY STEELHEAD TROUT IN 1977 AS RELATED TO REARING HISTORY. Univ. Idaho For. Wildl. Range Exp. Stn. Tech. Rep. 10. vii + 58p. June 1979. SFA 25(1)
[Idaho Coop. Fish. Res. Unit, Univ. Idaho, Moscow 83843]

80-000712 Harshbarger, T. J.; Porter, P. E. SURVIVAL OF BROWN TROUT EGGS: TWO PLANTING TECHNIQUES COMPARED. Prog. Fish-Cult. 47 (4): 206-209. Oct. 1979. SFA 25(1)
[U.S. For. Serv., Southeast For. Exp. Stn., Asheville, NC 28806]

80-000713 Johnston, T. B. CATCHABLE TROUT--A CONSENSUS NEEDED. Fisheries (Bull. Am. Fish. Soc.) 4 (5): 14-15. Sept.-Oct. 1979. SFA 25(1)

80-000714 Reimers, P. E. SUCCESS IN A HATCHERY PROGRAM WITH FALL CHINOOK SALMON BY SIMULATING THE NATURAL LIFE HISTORY OF THE STOCK. Prog. Fish-Cult. 47 (4): 192-195. Oct. 1979. SFA 25(1)
[Coastal Salmon Ecol. Prog., Oreg. Dep. Fish Wildl., Charleston 97420]

80-000715 Sholes, W. H.; Hallock, R. J. AN EVALUATION OF REARING FALL-RUN CHINOOK SALMON, /ONCORHYNCHUS TSHAWYTSCHA/, TO YEARLINGS AT FEATHER RIVER HATCHERY, WITH A COMPARISON OF RETURNS FROM HATCHERY AND DOWNSTREAM RELEASES. Calif. Fish Game 65 (4): 239-255. Oct. 1979. SFA 25(1)
[Box 164, Elmira, CA 95625] Fall-run chinook salmon, /Oncorhynchus tshawytscha/, were reared to yearlings (wt = 58 g) at Feather River Salmon and Steelhead Hatchery, and released in equal numbers at the hatchery and 225 km downstream in the lower Sacramento River near Rio Vista. Combined returns to the fisheries and spawning stocks were 7.5 percent: 6.1 percent to the fisheries and 1.4 percent to the spawning stocks. Yearlings released at the hatchery contributed more to the fisheries and spawning stocks (8.3 percent), with considerably less straying from the natal stream, than those released near Rio Vista (6.6 percent). When compared with returns from fingerling salmon (wt = 5 g), yearlings released at the hatchery contributed 12 times more to the fisheries. Based on minimum contributions to the fisheries and spawning stocks of all marked yearlings of the three brood years released, the benefit/cost ratio was 18.0:1.

80-000716 Wahle, R. J.; Smith, R. Z. A HISTORICAL AND DESCRIPTIVE ACCOUNT OF PACIFIC COAST ANADROMOUS SALMONID REARING FACILITIES AND A SUMMARY OF THEIR RELEASES BY REGION, 1960-76. NOAA Tech. Rep. NMFS SSRF- 736. iv + 40p. Sept. 1979. SFA 25(1)
[NMFS, 811 NE Oregon St., P.O. Box 4332, Portland, OR 97208] A brief history of the artificial culture of salmonid fishes in North America is presented. The report contains a Pacific coast section followed by sections for each of six major regions on the coast: Alaska, British Columbia, Washington coastal and Puget Sound, Columbia Basin, Oregon coastal, and California. The Columbia Basin is further divided into three subregions. The Pacific coast section provides information on current production of anadromous salmon (/Oncorhynchus/ spp.) and trout (/Salmo/ spp.). Each regional or subregional section contains a short history and background, a map with current rearing facilities located, a general hatchery information table, and migrant

80-000716 CONTINUED
release tables summarized by species. In the final portion of the report, changes in numbers of facilities, species reared, rearing techniques, and size at time of release are discussed.

80-000717 Wharton, J. C. F. IMPACT OF EXOTIC ANIMALS, ESPECIALLY EUROPEAN CARP /CYPRINUS CARPIO/, ON NATIVE FAUNA. Victoria Fish. Wildl. Pap. No. 20. 13p. Mar. 1979. SFA 25(1)
[Fish. Wildl. Div., 250 Victoria Parade, East Melbourne, Victoria, Australia 3002]

## FISHING GEAR AND TECHNIQUES

80-000718 Bath, D. W.; Hernandez, J. A.; Rippolon, T.; McCarey, G. TECHNIQUE FOR SIMULTANEOUS SAMPLING OF PLANKTONIC FISH EGGS AND LARVAE AT THREE DEPTHS. Prog. Fish-Cult. 41 (3): 158-160. July 1979. SFA 25(1)
[N.Y. Univ. Med. Cent., Inst. Environ. Med., 500 First Ave., New York, NY 10016]

80-000719 Collins, J. J. RELATIVE EFFICIENCY OF MULTIFILAMENT AND MONOFILAMENT NYLON GILL NET TOWARDS LAKE WHITEFISH (/COREGONUS CLUPEAFORMIS/) IN LAKE HURON. J. Fish. Res. Board Can. 36 (10): 1180-1185. Oct. 1979. In English with French summ. SFA 25(1)
[Ontario Minist. Nat. Resour., South Bay Fish. Res. Stn., Tehkummah, ON P0P 2C0, Canada]

80-000720 Corcoran, M. F. ELECTROFISHING FOR CATFISH: USE OF LOW-FREQUENCY PULSED DIRECT CURRENT. Prog. Fish-Cult. 47 (4): 200-201. Oct. 1979. SFA 25(1)
[Dep. Zool., Duke Univ., Durham, NC 27706]

80-000721 Gjernes, T. A PORTABLE MIDWATER TRAWLING SYSTEM FOR USE IN REMOTE LAKES. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 888. iii + 13p. June 1979. In English with French summ. SFA 25(1)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] A midwater trawling system capable of fishing over a wide depth range in lakes and also small enough to be transported by float-equipped aircraft was developed and tested. Two inflatable boats were used; the trawl was put out from one boat and towed from another equipped with a small winch. The trawl caught fish from the surface to depths greater than 50 m. Young sockeye salmon (/Oncorhynchus nerka/, fork length 30-100 mm) caught with this trawl (2 x 2 m at the mouth) were not significantly different in size than fish caught in a larger (3 x 6 m) trawl fished at greater speed. However, samples collected with the smaller trawl were more variable in size and number which suggests the 2 x 2-m net probably is close to the minimum size suitable for collecting these fish.

80-000722 Main, J.; Sangster, G. I. A STUDY OF BOTTOM TRAWLING GEAR ON BOTH SAND AND HARD GROUND. Scott. Fish. Res. Rep. No. 14. 15p. 1979. SFA 25(1)
[Mar. Lab., Aberdeen, Scotland]

80-000723 Tarplee, W. H., Jr.; Bryson, W. T.; Sherfinski, R. G. PORTABLE PUSH-NET APPARATUS FOR SAMPLING ICHTHYOPLANKTON. Prog. Fish-Cult. 47 (4): 213-215. Oct. 1979. SFA 25(1)
[Carolina Power and Light Co., Environ. Technol. Sect., Harris Energy Environ. Cent., New Hill, NC 27562]

FERTILIZATION OF WATER AND SOIL

80-000724 Noriega-Curtis, P. PRIMARY PRODUCTIVITY AND RELATED FISH YIELD IN INTENSELY MANURED FISHPONDS. Aquaculture 17 (4): 335-344. Aug. 1979. SFA 25(1)
[Apdo. Postal 94-28, Mexico 10, Mexico] Studies of various parameters associated with productivity were conducted in experimental manured ponds with the object of estimating the effects that organic manure produce on fish yield. Photosynthesis-depth profiles showed autoshading by the plankton resulting in compensation depths of approximately 70 cm. Net photosynthetic rates were found to be only slightly higher than those obtained under chemical fertilization. Their variation seemed to be somewhat independent of the total standing crop of plankton but was more directly related to the composition of the plankton. Several fish yield prediction models based on primary productivity were applied to the experimental data. In every case the results show that the actual yields considerably exceeded the predicted yields. This work gives support to the notion that primary productivity is not sufficient to account for the high fish yields attained in a manured system. Thus it is concluded that manuring of fish ponds may not only be a practice of fertilization but also a means of promoting growth of fish through some other alternative pathway.

80-000725 Stockner, J. G. LAKE FERTILIZATION AS A MEANS OF ENHANCING SOCKEYE SALMON POPULATIONS: THE STATE OF THE ART IN THE PACIFIC NORTHWEST. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 740. iii + 14p. Mar. 1979. In English with French summ. SFA 25(1)
[Fish. Mar. Serv., 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada] A review of the state of the art of lake enrichment as a means of increasing sockeye salmon and resident lake kokanee populations is presented. A review of case histories where lake fertilization or cultural eutrophication has been evaluated provides the framework for identifying research priorities which are subsequently listed and discussed in relation to their applicability to a core enhancement program and/or their scientific and regional suitability. Logistic, technical, and social problems encountered in past investigations are identified and listed for consideration in future programs.

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

80-000726 Kelso, J. R. M.; Milburn, G. S. ENTRAINMENT AND IMPINGEMENT OF FISH BY POWER PLANTS IN THE GREAT LAKES WHICH USE THE ONCE-THROUGH COOLING PROCESS. J. Great Lakes Res. 5 (2): 182-194. 1979. SFA 25(1)
[Dep. Fish. Oceans, Great Lakes Biolimnol. Lab., 875 Queen St. East, Sault Ste. Marie, ON P6A 2B3, Canada]

80-000727 McCabe, G. T., Jr.; Long, C. W.; Park, D. L. BARGE TRANSPORTATION OF JUVENILE SALMONIDS ON THE COLUMBIA AND SNAKE RIVERS, 1977. Mar. Fish. Rev. 41 (7): 28-34. July 1979. SFA 25(1)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112] During the spring of 1977 the National Marine Fisheries Service, in cooperation with the U.S. Army corps of Engineers, used two cargo tank barges to transport juvenile salmonids down the Snake and Columbia Rivers (through as many as eight dams) to safe release sites in the lower Columbia River. Barge design and performance are described. The transported Pacific salmon, /Oncorhynchus/ sp., and steelhead trout, /Salmo gairdneri/, were continually supplied with fresh river water pumped through the barge. Fish were released in the main channel approximately 9 km (5.6 miles) below Bonneville Dam, the lowermost dam on the Columbia River. A total of 3,517,242 juvenile Pacific salmon and steelhead trout were hauled on the barges.

80-000728 Powell, D. H.; Spencer, S. L. PARALLEL-BAR BARRIER PREVENTS FISH LOSS OVER SPILLWAYS. Prog. Fish-Cult. 47 (4): 174-175. Oct. 1979. SFA 25(1)
[Dep. Conserv. Nat. Resour., Game Fish Div., Montgomery, AL 36130]

MATHEMATICS, STATISTICAL METHODS AND MODELING

80-000729 Butler, S. A.; McDonald, L. L. A SIMULATION STUDY OF A CATCH-EFFORT MODEL FOR ESTIMATING MORTALITY RATES. Trans. Am. Fish. Soc. 108 (4): 353-357. July 1979. SFA 25(1)
[Dep. Zool., Univ. Wyo., Laramie 82071]

80-000730 Clark, C. W.; Mangel, M. AGGREGATION AND FISHERY DYNAMICS: A THEORETICAL STUDY OF SCHOOLING AND THE PURSE SEINE TUNA FISHERIES. NOAA Fish. Bull. 77 (2): 317-337. Apr. 1979. SFA 25(1)
[Dep. Math., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada] This paper describes mathematical models of exploited fish stocks under the assumption that a certain portion of the stock becomes available through a dynamic aggregation process. The surface tuna fishery is used throughout as an example. The effects of aggregation on yield-effort relationships, indices of abundance, and fishery dynamics are discussed. The predictions of the theory are notably different from those obtained from general-production fishery models, particularly in cases where the available substock has a finite saturation level. Possible effects include fishery "catastrophes" and lack of significant correlation between catch-per-unit-effort statistics and stock abundance. Various management implications of the models are also discussed.

80-000731 Coombs, R. F. ESTIMATING POPULATION PARAMETERS IN AN 'OPEN' FISH POPULATION. N.Z. J. Mar. Freshwater Res. 13 (1): 121-129. 1979. SFA 25(1)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19062, Wellington, New Zealand] A model for an 'open' fish population is described. Basically an expansion of the classical catch equation, it includes a 'population change' coefficient to allow for changes in population size induced by causes other than fishing. The model relates this coefficient to catch, fishing effort, initial population size, and catchability coefficient. With observed catch and fishing effort data incorporated, the remaining parameters are estimated by minimising sums of squares. This estimation process is applied to data from both real and simulated fisheries, and is shown to be effective if the basic assumptions of the model are met. If this is not so considerable errors occur, and these are investigated with respect to the examples.

80-000732 DeAngelis, D. L.; Cox, D. K.; Coutant, C. C. CANNIBALISM AND SIZE DISPERSAL IN YOUNG-OF-THE-YEAR LARGEMOUTH BASS: EXPERIMENT AND MODEL. Ecol. Model. 8: 133-148. Jan. 1980. SFA 25(1)

[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830] A mathematical model for the dynamics of a population of young-of-the-year largemouth bass was formulated on the basis of laboratory experiments. The model was used to make a tentative test of the hypothesis that differing availabilities of alternative foods are decisive in determining the rates of cannibalism and, hence, differences in the observed behavior of the laboratory populations. It was found that slight differences in the degree of dispersal of initial sizes of individuals were probably more important in influencing the population dynamics than alternative food availability or other factors. The model was then compared with data on largemouth bass growth from pond experiments, which showed that, with some modifications of parameter values, the model is also capable of describing the young-of-the-year population dynamics in a pond.

80-000733 Gatto, M.; Rinaldi, S. ESTIMATING ESCAPEMENTS OF ANADROMOUS FISHES VIA UPSTREAM TEST FISHING DATA. Ecol. Model. 8: 173-188. Jan. 1980. SFA 25(1)

[Cent. Teoria Sist., C.N.R., Politec. Milano, Milano, Italy] In many cases escapements of anadromous fishes are not counted directly but upstream test fishing data are quite often available. This paper suggests simple procedures for estimating escapements from test data and asks whether direct counting is always necessary. The application of these techniques to the study of steelhead trout status in the Skeena River (B.C., Canada) is reported on. Estimates of several interesting quantities (annual escapements, annual returns, etc.) are obtained and shown.

80-000734 Gatto, M.; Rinaldi, S. ON THE DETERMINATION OF A COMMERCIAL FISHERY PRODUCTION MODEL. Ecol. Model. 8: 165-172. Jan. 1980. SFA 25(1)

[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC, Canada]

80-000735 Hilborn, R. COMPARISON OF FISHERIES CONTROL SYSTEMS THAT UTILIZE CATCH AND EFFORT DATA. J. Fish. Res. Board Can. 36 (12): 1477-1489. Dec. 1979. In English with French summ. SFA 25(1)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

80-000736 Mendelssohn, R. DETERMINING THE BEST TRADE-OFF BETWEEN EXPECTED ECONOMIC RETURN AND THE RISK OF UNDESIRABLE EVENTS WHEN MANAGING A RANDOMLY VARYING POPULATION. J. Fish. Res. Board Can. 36 (8): 939-947. Aug. 1979. In English with French summ. SFA 25(1)
[NMFS, Southwest Fish. Cent., Honolulu, HI 96812]

80-000737 Moller, F. MANUAL OF METHODS IN AQUATIC ENVIRONMENT RESEARCH. PART 5--STATISTICAL TESTS. FAO Fish. Tech. Pap. No. 182. 131p. 1979. Available from FAO of the UN, Rome, Italy SFA 25(1)
[Ist. Econ. Polit. Agr., Univ. Milan, Italy]

80-000738 Siegel, R. A.; Mueller, J. J.; Rothschild, B. J. A LINEAR PROGRAMMING APPROACH TO DETERMINING HARVESTING CAPACITY: A MULTIPLE SPECIES FISHERY. NOAA Fish. Bull. 77 (2): 425-433. Apr. 1979. SFA 25(1)
[NMFS, Off. Resour. Conserv. Manage., Washington, DC 20235]

80-000739 Vlinov, V. V. A MODEL OF THE ABUNDANCE OF MONOCYCLIC FISH POPULATION WITH INDEPENDENT YEAR CLASSES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (3): 393-399. 1978. SFA 25(1)
[VNIRO, Moscow, USSR] On the basis of a method submitted by the author in previous works, a mathematical model of a population of a monocyclic type with intermittent and nonintermittent spawning has been constructed. The population is modeled on a system of automatic-control, including units of elimination and potential survival and pulse links.

80-000740 Weinstein, M. P.; Logan, D. T. DIVERSITY AS A MEASURE OF ALEWIFE (/ALOSA PSEUDOHARENGUS/) DOMINANCE IN SOUTHEASTERN LAKE ONTARIO. J. Great Lakes Res. 5 (2): 139-143. 1979. SFA 25(1)
[Dep. Biol., Va. Commonwealth Univ., Richmond, 23284] Nearshore fish assemblages at Nine Mile Point, Lake Ontario, were sampled with gill nets twice a month from April to December in 1974 and 1975. Seasonal Fluctuations in diversity (H') were compared with and without the presence of alewife (/Alosa pseudoharengus/), which comprised about 75 percent of the total number of individuals. Because H' was highly correlated with the proportional contribution (p(i) log p(i)) of alewife abundance, fairly large temporal changes in composition of the remainder of the fish community were masked. This effect was explained by certain properties of the H' index; i.e., once a species has a dominance greater than about 70 percent, it influences H', not only through its own contribution, but also by restricting p(i) values for all other species below 0.30, the region where the index is most sensitive to change.

80-000741 Yeh, G.-T.; Yeh, C. F. MATHEMATICAL MODELING OF THE DISTRIBUTION OF FISH EGGS FROM SPAWNING REGIONS OF A RIVER. Ecol. Model. 8: 97-107. Jan. 1980. SFA 25(1)
[Oak Ridge Natl. Lab., Oak Ridge, TN 37830] A deterministic mathematical model, based on the conservation of numbers, is proposed for predicting the distribution of fish eggs after they drift away from the spawning regions. In the model, the effects of egg settling, diffusion capability of the water body, river currents and river boundaries are all included. Close form solution is obtained for the governing partial differential equation. In deriving the solution, egg-flux across river banks, water surface or bottom is suppressed. Application of the model is illustrated by an example. The result should provide the biological community with a quick and easy way of predicting the location of fish eggs in a river.

LAKE MANAGEMENT & RESEARCH

80-000742 Barica, J.; Mathias, J. A. OXYGEN DEPLETION AND WINTERKILL RISK IN SMALL PRAIRIE LAKES UNDER EXTENDED ICE COVER. J. Fish. Res. Board Can. 36 (8): 980-986. Aug. 1979. In English with French summ. SFA 25(1)
[Dep. Fish. Oceans, Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

80-000743 Benda, R. S. ANALYSIS OF CATCH DATA FROM 1968 TO 1976 FROM NINE FISH LANDINGS IN THE KENYA WATERS OF LAKE VICTORIA. J. Fish Biol. 15 (4): 385-387. Oct. 1979. SFA 25(1)
[Coop. Fish. Res. Unit, S. Dak. State Univ., Brookings 57007]

80-000744 Henry, F. D., Jr. THE INTRODUCTION OF SOUTHEASTERN BLUEGILL, /LEPOMIS MACROCHIRUS PURPURESCENS/, INTO LAKE PERRIS, CALIFORNIA, WITH NOTES ON THE GROWTH OF THE INITIAL YEAR CLASS. Calif. Fish Game 65 (4): 279-281. Oct. 1979. SFA 25(1)
[Calif. Dep. Fish Game, Oper. Res. Br., 2201 Garden Rd., Monterey 93940]

80-000745 Martin, G. G. IMPACT OF FISHING ON THE INSHORE FISHERY OF LAKE VICTORIA (EAST AFRICA). J. Fish. Res. Board Can. 36 (8): 891-900. Aug. 1979. In English with French summ. SFA 25(1)
[Environ. Policy Inst., East-West Cent., Honolulu, HI 96848]

80-000746 Otto, C. THE EFFECTS ON A PIKE (/ESOX LUCIUS/ L.) POPULATION OF INTENSIVE FISHING IN A SOUTH SWEDISH LAKE. J. Fish Biol. 15 (4): 461-468. Oct. 1979. SFA 25(1)
[Dep. Zool., Univ. Stockholm, Box 6801, S-113 86 Stockholm, Sweden] During seven years of intensive fishing, the average individual size of pike caught declined progressively until the last year of the study. The size structure of the population markedly changed. Three phases could be identified. 1. a high proportion of large fish, 2. a high proportion of small fish, and 3. equal numbers of large and small fish. The growth of the different year classes in their first year of life showed an increase from 180 to 220 mm.

80-000747 Regier, H. A. CHANGES IN SPECIES COMPOSITION OF GREAT LAKES FISH COMMUNITIES CAUSED BY MAN. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 558-566. 1979. SFA 25(1)
[Inst. Environ. Stud., Univ. Toronto, Toronto, ON, Canada]

80-000748 Whillans, T. H. HISTORIC TRANSFORMATIONS OF FISH COMMUNITIES IN THREE GREAT LAKES BAYS. J. Great Lakes Res. 5 (2): 195-215. 1979. SFA 25(1)
[Inst. Environ. Stud., Univ. Toronto, Toronto, ON M5S 1A4, Canada] Fish community transformation is investigated for the period from early settlement to the present in Toronto and Burlington Bays, Lake Ontario, and Inner Long Point Bay, Lake Erie. Extensive historic documentation and interviews are combined as case histories detailing changes in fish communities due to changes in water levels, temperature, shoreline configuration, circulation, inflow, watershed conditions, bathymetry, bottom materials, siltation, water conditions, aquatic macrophytes, plankton, benthic invertebrates, stocked fish, commercial and sport fishing. The most stressful perturbations were shoreline and benthic modifications in Toronto Bay, deteriorating water conditions in Burlington Bay, and exploitation in Inner long Point Bay. Differences between responses of pelagic migrants and near-shore residents to stress appeared to vary according to preadaptation of the species and the flexibility of its life pathways. The overall transformations of the communities have some similarities between time periods and from community to community.

RIVER AND STREAM MANAGEMENT & RESEARCH

80-000749 Alexander, G. R.; Buc, W. J.; Schnicke, G. T. TRENDS IN ANGLING AND TROUT POPULATIONS IN THE MAIN AU SABLE AND NORTH BRANCH AU SABLE RIVERS FROM 1959 THROUGH 1976. Mich. Dep. Nat. Resour. Fish. Res. Rep. No. 1865. 59p. 11 June 1979. SFA 25(1)
The anglers' fishing effort and catch of trout were lower in the Main Au Sable but higher in the North Branch of the Au Sable over the years 1959 through 1976. Brown trout growth became poorer over time in the Burton's Landing to Wakeley Bridge segment of the Main Au Sable, but decreased little in the other river segments studied. Brook trout growth did not change significantly in any river segment. Survival rates of second and third summer brown trout were better in both streams during the later years of investigation. Brook trout survival rates remained relatively constant. The total trout population (standing crop by weight) generally decreased in the Main Au Sable but increased in the North Branch of the Au Sable. Brown trout populations became progressively higher and brook trout lower during the study period. The causes for the changes noted cannot be determined with certainty because of the many alterations made in the fish habitat, fish stocking policies and fishing regulations.

80-000750 Blackett, R. F. ESTABLISHMENT OF SOCKEYE (/ONCORHYNCHUS NERKA/) AND CHINOOK (/O. TSHAWYTSCHA/) SALMON RUNS AT FRAZER LAKE, KODIAK ISLAND, ALASKA. J. Fish. Res. Board Can. 36 (10): 1265-1277. Oct. 1979. In English with French summ. SFA 25(1)
[Alaska Dep. Fish Game, Kodiak 99615]

80-000751 Mauney, M. ASSESSMENT OF THE IMPACT OF A SHALLOW RESERVOIR ON BENTHIC MACROINVERTEBRATE AND FISH COMMUNITIES OF A SECOND ORDER STREAM IN THE VIRGINIA PIEDMONT. Ph.D. dissertation, Va. Polytech. Inst. State Univ. 161p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(5):2034. Nov. 1979. SFA 25(1)

An investigation was conducted over a 12-month period to determine the extent of impact of an 88 ha impoundment on downstream water quality and aquatic consumer communities. The downstream impact of the reservoir was very localized. Most physical, chemical, and biotic parameters examined 1200 m below the dam were equivalent to upstream levels or were intermediate between those of the upstream and tailwaters stations.--From abstr.

80-000752 Moffitt, C. M. RECOLONIZATION OF AMERICAN SHAD, /ALOSA SAPIDISSIMA/ (WILSON) ABOVE RAINBOW DAM FISHLADDER, FARMINGTON RIVER, CONNECTICUT. Ph.D. dissertation, Univ. Mass. 144p. 1979. From Diss. Abstr. Int. B Sci. Eng. 40(3):1045. Sept. 1979. SFA 25(1)

Natural recolonization of American shad was studied for two years, 1976-1977, following construction of Rainbow Dam fishladder, Farmington River, Connecticut. In both years of operation approximately 50 to 60 percent of the shad seen moving upstream in the fishladder at the counting window actually entered the reservoir. Shad that did not enter the reservoir dropped out of the fishladder chiefly at sunset, or died and were recovered from the fishladder. Prespawning upstream movements in the ladder were concentrated during afternoon hours. Spawning was documented at night in the upper reservoir areas in both years. In 1977, successful spawning was also recorded 16 km upstream from the dam, above a white water area. Downstream migrations of postspawning adults occurred from mid June to mid July and were positively correlated with increased flow rates into the fishladder. Only with increased water flow did adult shad re-enter the fishladder, and only 5 percent of the successful upstream migrants were observed moving downstream alive in 1977. Mortality in prespawning and postspawning adults was significanly higher for females and was consistent with observations of fewer repeat spawning scars on female shad scales in this and other shad studies.--From abstr.

80-000753 Welcomme, R. L. , (compiler) FISHERY MANAGEMENT IN LARGE RIVERS. FAO Fish. Tech. Pap. No. 194. v + 60p. Apr. 1979. SFA 25(1)

[FAO of the UN, Rome, Italy]

## LARGE IMPOUNDMENT MANAGEMENT & RESEARCH

80-000754 Bruce, W. J.; Parsons, R. F. BIOLOGY OF THE FISHES OF OSSOKMANUAN RESERVOIR, LABRADOR, 1976. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 836. iv + 33p. May 1979. In English with French summ. SFA 25(1)

[Fish. Mar. Serv., P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

Experimental gillnet sets on the Ossokmanuan Reservoir, Labrador revealed /Coregonus clupeaformis/ and /Catostomus catostomus/ were the dominant fish species. Other species present included /Salvelinus namaycush/, /Esox lucius/, /Lota lota/, landlocked /Salmo salar/, /Prosopium cylindraceum/ and /Catostomus commersoni/. /Coregonus clupeaformis/ and /Catostomus catostomus/ displayed an increase in mean length with increasing mesh size but lake trout and northern pike did not. Catch per unit of effort (kg/100 m of net/24 h) values for lake whitefish varied from 0 to 4.4, while trout values ranged from 0.3 to 16.7. Lake whitefish growth rate was slow and there was

80-000754 CONTINUED
considerable overlap of ages for different length intervals; annual mortality rate was 0.4; age at first maturity ranged from 3 to 11 years; fecundity ranged from 967 (16.3 cm) to 20,963 (46.0 cm). Lake trout growth was slow; age at first maturity was 10 years. Egg counts from 24 fish ranged from 1662 (50.9 cm) to 11,906 (78.8 cm).

ESTUARY MANAGEMENT & RESEARCH

80-000755 MacFarland, J. W.; Weinstein, R. S. THE NATIONAL ESTUARINE SANCTUARY PROGRAM. Coast. Zone Manage. J. 6 (1): 89-97. 1979. SFA 25(1)
[Off. Coast. Zone Manage., NOAA, U.S. Dep. Commer., Washington, DC] In the 1972 Coastal Zone Management Act, Congress established the Estuarine Sanctuary Program in response to two government studies showing that estuaries are economically and ecologically valuable to man and that they are in danger of being physically altered and polluted. The program makes available fifty-percent matching grants to coastal states to help them set aside estuarine areas for the purposes of research and education. The sanctuaries will serve as natural outdoor laboratories for scientists and the public, and will also help to preserve natural habitats for estuarine dependent species. The information gained within these areas will aid in future management decisions concerning the coastal zone. the sanctuaries are established and operated under the Estuarine Sanctuary Guidelines, which provide for three distinct types of grants: preacquisition, acquisition, and operations. At the present time there are five sanctuaries in operation, with others in the planning stage. The five established sanctuaries are in the South Slough, Oregon; Sapelo Island, Georgia; Waimanu, Hawaii; Old Woman Creek, Ohio; and Rookery Bay, Florida.

80-000756 Stevens, D. E.; Chadwick, H. K. SACRAMENTO-SAN JOAQUIN ESTUARY--BIOLOGY AND HYDROLOGY. Fisheries (Bull. Am. Fish. Soc.) 4 (4): 2-6. July-Aug. 1979. SFA 25(1)
[4001 N. Wilson Way, Stockton, CA 95205]

80-000757 Weinstein, M. P. SHALLOW MARSH HABITATS AS PRIMARY NURSERIES FOR FISHES AND SHELLFISH, CAPE FEAR RIVER, NORTH CAROLINA. NOAA Fish. Bull. 77 (2): 339-357. Apr. 1979. SFA 25(1)
[Dep. Biol., Va. Commonwealth Univ., Richmond 23284] Seine and rotenone collections taken during 1977 from the upper reaches of tidal creeks and along the marsh fringe in the vicinity of the Cape Fear River, N.C., indicated that these areas serve as primary nursery habitats for postlarval and juvenile fishes and shellfish. Average densities (number/400m$^2$) for several ocean-spawned species at the peak of postlarval or early juvenile recruitment were high: spot, /Leiostomus xanthurus/, 3,099; Atlantic menhaden, /Brevoortia tyrannus, 839; striped mullet, /Mugil cephalus/, 711; white mullet, /Mugil curema/, 525; and brown shrimp, /Penaeus aztecus/, 329. Standing crops for the majority of species studied further indicated that lower productivity per unit area occurred in high salinity marshes closest to the ocean. In addition, distribution patterns for several species were significantly correlated with salinity and substrate characteristics or combinations of them and seasonal effects also were evident so that related and potentially competing species were separated temporally. Community analyses demonstrated that each marsh complex was unique; however, overall similarity for the most abundant species was high. The differences were related to salinity gradients and to the presence of an "edge effect" where marshes

80-000757 CONTINUED
closest to the river mouth were species rich due to seasonal invasion by low densities of reef, nearshore, and shelf marine species. Similarly, freshwater fishes invaded brackish marshes during periods of high river flow.

MARINE MANAGEMENT & RESEARCH

80-000758 Elder, R. D. EQUILIBRIUM YIELD FOR THE HAURAKI GULF SNAPPER FISHERY ESTIMATED FROM CATCH AND EFFORT FIGURES, 1960-74. N.Z. J. Mar. Freshwater Res. 13 (1): 31-38. 1979. SFA 25(1)
[Fish. Res. Div., Minist. Agric. Fish. P.O. Box 19062, Wellington, New Zealand] To examine the significance of trends in catch, and to calculate an equilibrium yield for the Hauraki Gulf snapper fishery, catch and effort statistics for Danish seine, trawl, line, and non-powered net fishing methods are analysed for the years 1960-74. The catch per day at sea of a trawl is used as standard, and a catch-effort model is formulated. The model shows that a maximum equilibrium yield of 4153 t per annum from 7402 standard days (=trawl days) fishing at a catch-rate of 561 kg per standard day can be expected from the fishery. The relative fishing power of each method is evaluated against the trawl. The analysis suggests that the increased landings of snapper from the Gulf during the last 6 years have over-exploited the fishery. It is predicted that the down-turn in landings which commenced in 1972-73 will continue unless management action is taken to reduce the level of effort or control landings.

80-000759 FAO of the UN GENERAL FISHERIES COUNCIL FOR THE MEDITERRANEAN. REPORT OF THE FOURTEENTH SESSION NANTES, FRANCE, 16-20 OCTOBER 1978. Gen. Fish. Counc. Mediterr. Rep. 14. 42p. 1978. SFA 25(1)
[Rome, Italy]

80-000760 FAO of the UN REPORT OF THE FIRST SESSION OF THE WESTERN CENTRAL ATLANTIC FISHERY COMMISSION WORKING PARTY ON FISHERY STATISTICS, PANAMA, PANAMA, 16-17 MAY 1978. FAO Fish. Rep. No. 212. v + 29p. 1978. SFA 25(1)
[Rome, Italy]

80-000761 Goulet, J. R., Jr.; Haynes, E. D. , (eds.) OCEAN VARIABILITY IN THE U.S. FISHERY CONSERVATION ZONE, 1976. NOAA Tech. Rep. NMFS Circ. 427. iv + 362p. July 1979. SFA 25(1)
[NMFS, NOAA, Washington, DC 20235]

80-000762 Ingham, M. C. MARINE ENVIRONMENTAL CONDITIONS OFF THE ATLANTIC AND GULF COASTS OF THE UNITED STATES, JANUARY 1977-MARCH 1978. Mar. Fish. Rev. 41 (5/6): 35-47. May-June 1979. SFA 25(1)
[NMFS, Narragansett, RI 02882]

80-000763 Ingraham, W. J., Jr. THE ANOMALOUS SURFACE SALINITY MINIMA AREA ACROSS THE NORTHERN GULF OF ALASKA AND ITS RELATION TO FISHERIES. Mar. Fish. Rev. 41 (5/6): 8-19. May-June 1979. SFA 25(1)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

80-000764 International Pacific Halibut Commission INTERNATIONAL PACIFIC HALIBUT COMMISSION ANNUAL REPORT 1978. Int. Pac. Habibut Comm. Annu. Rep. 1978 40p. 1979. SFA 25(1)
[P.O. Box 5009, University Station, Seattle, WA 98105]

80-000765 Laist, D.; Epting, J. HIGHTIDE: THE GROWING NEED FOR FEDERAL-STATE COOPERATION IN MANAGING THE SEA. Coast. Zone Manage. J. 6 (1): 1-7. 1979. SFA 25(1)
[Mar. Mammal Comm., 1625 Eye St., N.W., Washington, DC]

80-000766 Liao, D. S.; Cupka, D. M. ECONOMIC IMPACTS AND FISHING SUCCESS OF OFFSHORE SPORT FISHING OVER ARTIFICIAL REEFS AND NATURAL HABITATS IN SOUTH CAROLINA. S.C. Mar. Resour. Cent. Tech. Rep. No. 38. 27p. May 1979. SFA 25(1)
[Mar. Resour. Res. Inst., S.C. Wildl. Mar. Resour. Dep., Charleston 29412]

80-000767 McLain, D. R.; Favorite, F.; Lynn, R. J. MARINE ENVIRONMENTAL CONDITIONS OFF THE PACIFIC COAST OF THE UNITED STATES, JANUARY 1977-MARCH 1978. Mar. Fish. Rev. 41 (5/6): 48-69. May-June 1979. SFA 25(1)
[NMFS, Monterey, CA 93940]

80-000768 Pedrick, R. A. MARINE ENVIRONMENTAL CONDITIONS OFF THE COASTS OF THE UNITED STATES, JANUARY 1977-MARCH 1978--INTRODUCTION. Mar. Fish. Rev. 41 (5/6): 32-34. May-June 1979. SFA 25(1)
[NMFS, 3300 Whitehaven St. N.W., Washington, DC 20235]

80-000769 Ulrich, G.; Chipley, N.; McCord, J. W.; Cupka, D. DEVELOPMENT OF FISHERY MANAGEMENT PLANS FOR SELECTED ANADROMOUS FISHES IN SOUTH CAROLINA/GEORGIA. S.C. Mar. Resour. Cent. Spec. Sci. Rep. No. 14. iv + 135p. 1979. SFA 25(1)
[S.C. Wildl. Mar. Resour. Dep., P.O. Box 12559, Charleston 29412]

80-000770 Yesaki, M. RAINBOW RUNNER: A LATENT OCEANIC RESOURCE? Mar. Fish. Rev. 41 (8): 1-6. Aug. 1979. SFA 25(1)
[P.O. Box 618, Bangkok, Thailand]

## UTILIZATION OF FISHERY PRODUCTS

80-000771 Johnson, J. M., Sr. MANAGEMENT OF UNITED STATES FISH AND WILDLIFE RESOURCES AND SPECIAL RIGHTS OF NATIVE AMERICANS. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 594-600. 1979. SFA 25(1)
[Wash. State Attny. Gen. Off., Olympia]

80-000772 Liem, A. J.; Naish, V. A. DIFFERENCE IN TASTE BETWEEN THE RIGHT AND LEFT SIDES OF TAINTED FISH. J. Fish. Res. Board Can. 36 (11): 1412-1413. Nov. 1979. In English with French summ. SFA 25(1)
[Domtar Inc., Res. Cent., Senneville, PQ H9X 3L7, Canada]

80-000773 Schulz, P. D. FISH REMAINS FROM A HISTORIC CENTRAL CALIFORNIA INDIAN VILLAGE. Calif. Fish Game 65 (4): 273-276. Oct. 1979. SFA 25(1)
[Calif. Dep. Parks Recreation, P.O. Box 2390, Sacramento 95811]

80-000774 Skea, J. C.; Simonin, H. A.; Harris, E. J.; Jackling, S.; Spagnoli, J. J.; Symula, J.; Colquhoun, J. R. REDUCING LEVELS OF MIREX, AROCLOR 1254, AND DDE BY TRIMMING AND COOKING LAKE ONTARIO BROWN TROUT (/SALMO TRUTTA/ LINNAEUS) AND SMALLMOUTH BASS (/MICROPTERUS DOLOMIEUI/ LACEPEDE). J. Great Lakes Res. 5 (2): 153-159. 1979. SFA 25(1)
[N.Y. State Dep. Environ. Conserv., 8314 Fish Hatchery Rd., Rome 13440] Trimming of Lake Ontario smallmouth bass (/Micropterus dolomieui/ Lacepede) and brown trout (/Salmo trutta/ Linnaeus) was found to reduce levels of mirex, Aroclor 1254, and DDE by 43 percent to 64 percent. Trimming included the removal of the skin, dorsal and ventral fat, and the entire lateral line. Of the cooking methods tested (smoking, broiling, baking, and deep frying), only deep frying produced consistently high reductions of all three contaminants.

MISC. TECHNIQUES AND EQUIPMENT

80-000775 Foote, K. G. ON REPRESENTING THE LENGTH DEPENDENCE OF ACOUSTIC TARGET STRENGTHS OF FISH. J. Fish. Res. Board Can. 36 (12): 1490-1496. Dec. 1979. In English with French summ. SFA 25(1)
[Dep. Appl. Math., Univ. Bergen, 5014 Bergen, Norway]

80-000776 Lemke, A. E.; Dawson, W. F. TEMPERATURE-MONITORING AND SAFETY-CONTROL DEVICE. Prog. Fish-Cult. 41 (3): 165-166. July 1979. SFA 25(1)
[U.S. EPA, Environ. Res. Lab., 6201 Congdon Blvd., Duluth, MN 55804]

80-000777 Neitzel, D. A.; Page, T. L.; Barraclough, S. A. SELF-INFLATING BUOY FOR UNDERWATER USE. Prog. Fish-Cult. 41 (3): 119-120. July 1979. SFA 25(1)
[Battelle Pac. Northwest Lab., Richland, WA 99352]

80-000778 Traynor, J. J.; Ehrenberg, J. E. EVALUATION OF THE DUAL BEAM ACOUSTIC FISH TARGET STRENGTH MEASUREMENT METHOD. J. Fish. Res. Board Can. 36 (9): 1065-1071. Sept. 1979. In English with French summ. SFA 25(1)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

SPORT FISHING TECHNIQUES

80-000779 Smith, S. E. CHANGES IN SALTWATER ANGLING METHODS AND GEAR IN CALIFORNIA. Mar. Fish. Rev. 41 (9): 32-44. Sept. 1979. SFA 25(1)
[NMFS, 3150 Paradise Dr., Tiburon, CA 94920]

WATER USE AND CONSERVATION

80-000780 Baughman, J. WYOMING'S WATER ... GOING FAST. Wyo. Wildl. 43 (12): 6-9. Dec. 1979. SFA 25(1)
[Wyo. Game Fish Dep., Casper]

80-000781 Doucet, G. J.; Bider, J. R. HYDROELECTRIC DEVELOPMENTS IN NORTHERN QUEBEC. Trans. N. Am. Wildl. Nat. Resour. Conf. 44: 225-234. 1979. SFA 25(1)
[Macdonald Campus McGill Univ., Ste. Anne de Bellevue, Quebec, Canada]

Abbasov, G. S.
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80-000128
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Africa: Lake Victoria
80-000745
Alaska: Chignik Lakes
80-000666
Alaska: Gulf of Alaska
80-000763
Alaska: Kodiak Island: Frazer Lake
80-000750
Antarctic
80-000505
Aral Sea
80-000441
Arizona
80-000487
Arizona: Lake Powell
80-000697
Arkansas: Caddo River
80-000362
Arkansas: Illinois River
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Atlantic Ocean
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80-000575
Atlantic Ocean: Bahama Islands
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Atlantic Ocean, North
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Atlantic Ocean, North: Bay of Biscay
80-000323
Atlantic Ocean, North: Canary Current
80-000482
Atlantic Ocean, West Central
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Australia
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Australia: Western Australia
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Bahama Islands
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Barents Sea
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Bering Sea
80-000436
Black Sea
80-000297
80-000443
Brazil
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California
80-000437
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California: Anaheim Bay
80-000457
California: Colusa Cty.
80-000773
California: Lake Casitas
80-000563
California: Los Angeles Cty.
80-000604
California: Mono Cty.: Bunny Lake
80-000374
California: Monterey Bay
80-000470
California: Riverside Cty.: Lake Perris
80-000744
California: Sacramento River
80-000715
California: Sacramento-San Jouquin Estuary
80-000756
Canada
80-000530
80-000683
80-000687
Canada: British Columbia
80-000066
Canada: British Columbia: Great Central Lake
80-000071
Canada: Labrador: Churchill Falls
80-000596
Canada: Labrador: Ossokmanuan Reservoir
80-000754
Canada: Manitoba
80-000742
Canada: Manitoba: Whitemouth River
80-000347
Canada: Newfoundland: Gros Morne Natl. Park
80-000352
Canada: Nova Scotia: Margaree River
80-000543
Canada: Ontario
80-000671
Canada: Ontario: Experimental Lakes Area
80-000069
Canada: Ontario: Kawartha Lakes
80-000338
Canada: Pacific Ocean
80-000699
Canada: Quebec
80-000781
Canada: Quebec: Baffin Island
80-000527
Canada: Quebec: Lake Memphremagog
80-000068
Canada: Quebec: Magdalen Islands
80-000700
Canada: Yukon Territory
80-000295
Caribbean Sea
80-000507
Caspian Sea
80-000369
80-000501

Columbia River
80-000727
Connecticut: Fairfield Cty.
80-000558
Connecticut: Farmington River
80-000752
Curacao
80-000373
Ecuador
80-000483
England
80-000590
England: Essex
80-000562
England: Medway Estuary
80-000379
England: Slapton Ley
80-000456
England: South Lancashire: Grey Mist Mere
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Europe
80-000667
Finland
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Florida
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80-000693
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Florida: Apalachicola Bay
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Florida: Card Sound
80-000605
Florida: Marco Island
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Georgia
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Great Lakes
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Greenland
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Guam
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Gulf of Aden
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Gulf of Mexico
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Hawaii
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Iceland: Lake Myvatn
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Iceland: River Laxa
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Idaho
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Idaho: Silver Creek
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Illinois: Johnson Cty.: Max Creek
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India
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India: River Ganges
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Indian Ocean
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Iowa: Mahaska Cty.
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Iowa: Marion Cty.
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Italy: Lago Maggiore
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Japan
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Kentucky: Trimble Cty.: Ohio River
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Kenya: Lake Victoria
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Lake Huron
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Lake Michigan
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Lake Ontario
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Lake Victoria
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Ligurian Sea
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Malaysia
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Mediterranean Sea
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Michigan: Huron River
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Minnesota: Minnesota River
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Mississippi
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Mississippi: Horn Island
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Missouri
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Montana
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Montana: Flathead Lake
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Nebraska: Lancaster Cty.: Branched Oak Lake
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Nevada: Jersey Valley
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Nevada: Pyramid Lake
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New Caledonia
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New England
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New Mexico
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New York
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New York: Erie Cty.: Derby Brook
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New York: Hudson River
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